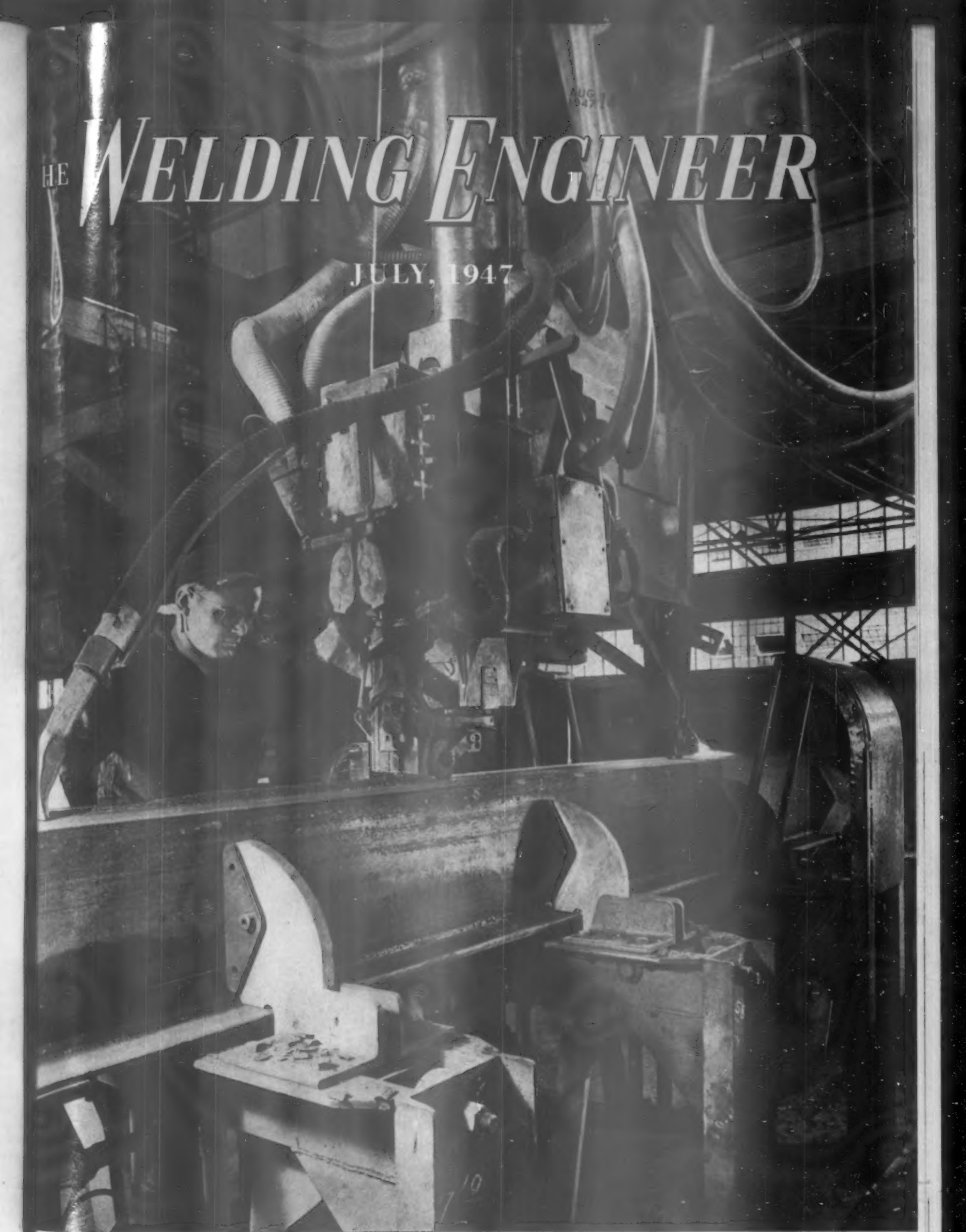

THE WELDING ENGINEER

JULY, 1947

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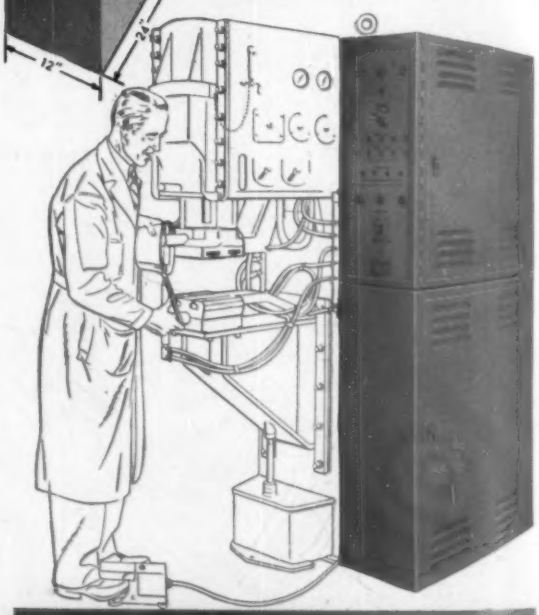

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THE WELDING ENGINEER

THE WELDING ENGINEER, *with which is combined The Acetylene Journal*

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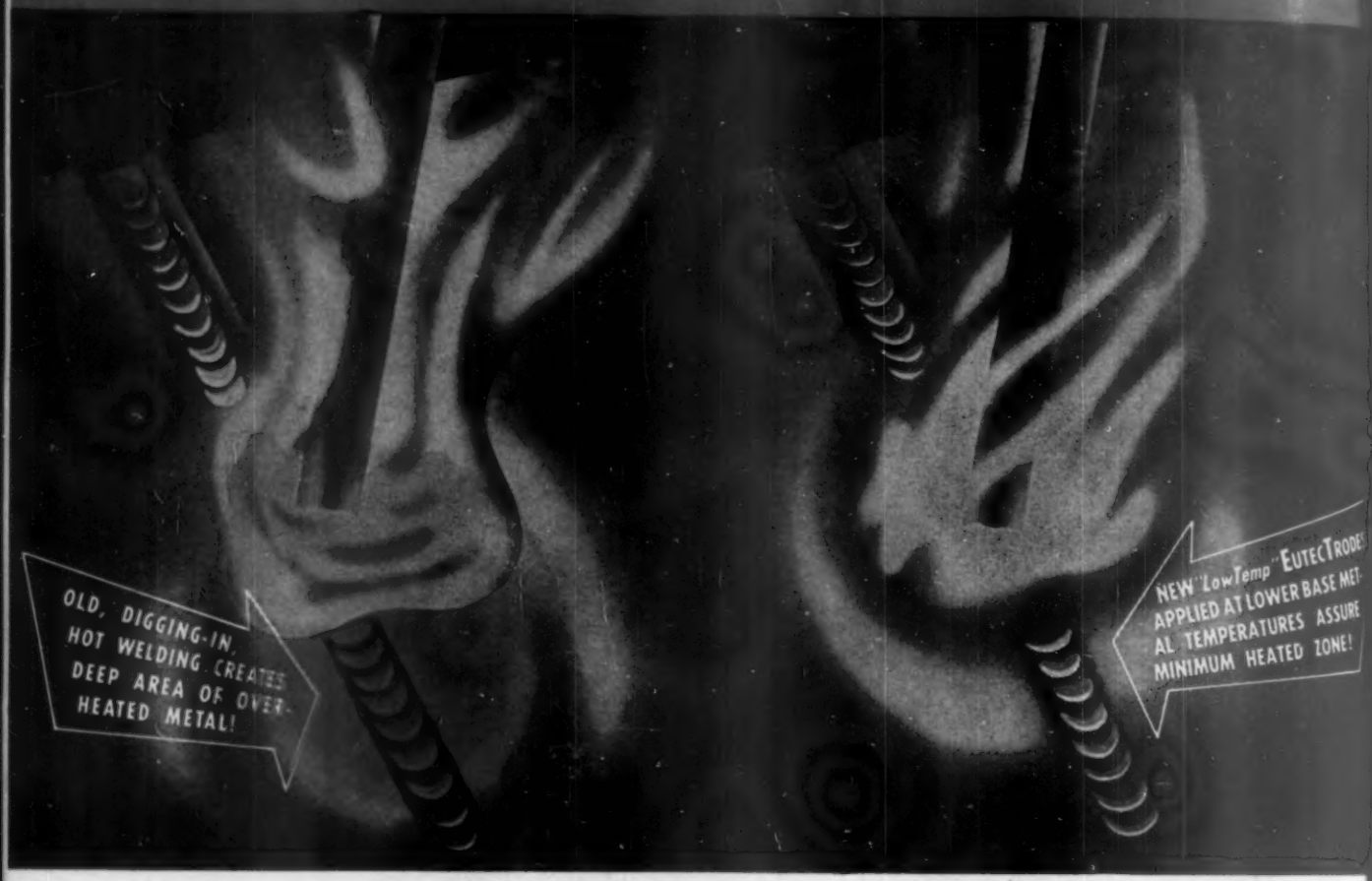
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THE WELDING ENGINEER

JULY, 1947

When Do We Start to Think?

"SAFETY is for the other fellow—me, I'm careful!" Careful but unconscious.

Did you ever notice that "I didn't think" is frequently the first sentence uttered by the man or woman involved in an accident? Sometimes these words are moaned by the victim, whose failure to think has hurt only himself. He may be a cripple for life, though. On other occasions, "I didn't think" is offered as an alibi by the man who started a chain of circumstances that made an accident victim of a co-worker. Not thinking may have seriously injured a friend and caused the non-thinker untold hours of mental anguish—too late.

We are all prone to do things without thinking, just as we sometimes say things without thinking—in both cases often to our regret. Well, when do we start to think?

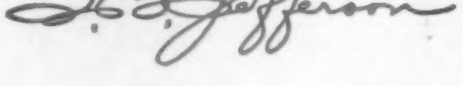
Nothing happens faster than an accident. One minute everything is rosy, and the next you are all wrapped up in a big bundle of trouble, but the intervening period is frequently a blank. "Things happened so fast I don't really know what took place" is heard frequently in the testimony of those who participated in an accident. Well, when things are apt to go off all at once, like a package of firecrackers, it's high time you started to think about them.

A small fire aboard a ship resulted in the killing of nearly 500 people, injuries to 3,000 more and the destruction of a large portion of a town of 15,000 population. It all happened because someone didn't think. No, the careless acts of most people do not inflict so severe a penalty. But if a man is only scratched because of a careless act, that does not excuse the carelessness.

Recently I saw a weldor make an apron from a burlap bag because he didn't want arc spatter to burn pinholes in his Sunday pants. He should have put on his leathers, but he didn't stop to think. Burlap ignites easily, and before our weldor friend had lifted his hood to change electrodes his apron was aflame. Instead of pinholes in his Sunday pants, he burned off all of the belt loops—and was lucky!

Equally unconscious was the flame-cutting operator—there are all too many of them—who wore his old oxfords on the job and got a "hotfoot" from molten slag. Safety shoes would have saved him that painful discomfort, but he didn't stop to think. Nor did the fellow who wouldn't stop to tend a "sissy" burn and is now in the hospital because of the infection that developed from it.

In view of the amount of effort and money that has been expended to teach the weldor to take care of himself, "I didn't think" is an extremely poor alibi to offer. It's time that we all stopped using it.



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★ CONSTRUCTION

Pipe For the "BIGGEST INCH"

The production of 214 miles of 30-in. pipe is no easy task when the pipe has to be gastight. The 60-ft sections are turned out by Consolidated Steel Corp., Los Angeles, on an assembly-line basis, using specially designed machines for submerged-melt automatic welding.

BY FRED M. BURT

For lack of a market, nearly 400 million cubic feet per day of natural gas are now wasting at oil wells and gasoline plants in the Permian Basin in West Texas and New Mexico. Farther to the north, in the Hugoton and Panhandle dry gas fields, covering 4,200,000 acres in Texas, Oklahoma and Kansas, is the largest known gas reserve in the world; recoverable gas is estimated at approximately 40 trillions of cubic feet in this area.

To Bring It to Market

Some 1,200 miles to the west we find the large and growing Los Angeles industrial area. Here the demand for natural gas is running up to 800 million cubic feet daily, supplied from dwindling reserves. Obviously, it is highly desirable to find a way to span that 1,200-mile gap.

To bring the supply to the demand, the "Biggest Inch" line is being built, 214 miles of 30-in. welded piping extending from the Colorado river at Blythe, Calif., to Santa Fe Springs near Los Angeles. The other thousand miles will be traversed by a 26-in. line built by the El Paso Natural Gas Company and running from the gas fields to Blythe.

The 214-mile line is being built jointly by the Southern California Gas Company and the Southern Counties Gas Company of California. The installation contract was awarded to the H. C. Price Co., Los Angeles. The pipe is being fabricated in a newly installed production line in the Maywood plant of Consolidated Steel Corp., a plant calculated to have a capacity of nine miles of pipe per week in full production.

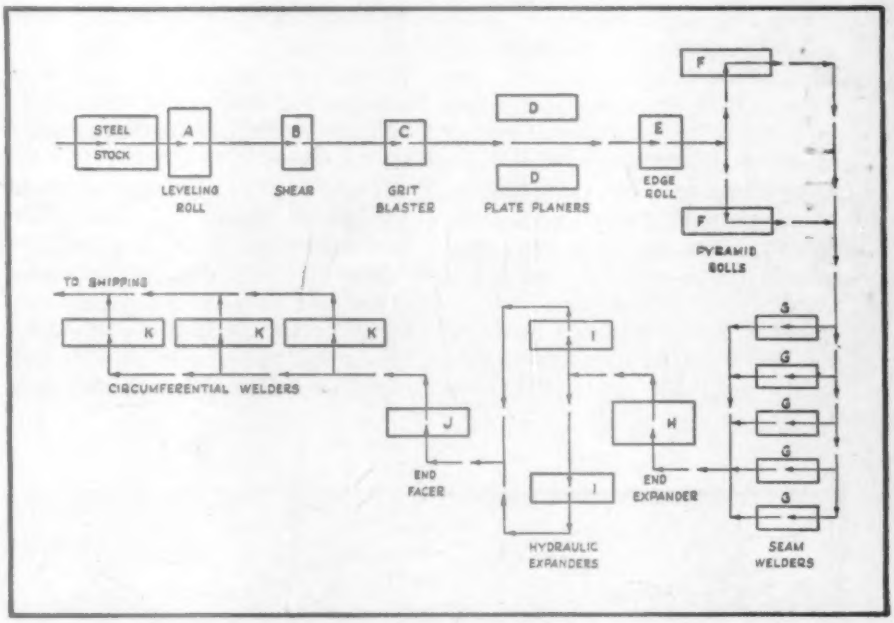


Fig. 1—Process diagram for 30-in. OD pipe at Consolidated Steel Corp. Eleven major production operations are necessary to convert the steel stock into the finished circumferentially welded sections. Arrows indicate work flow

The forming and welding of the Biggest Inch pipe is the subject of this article. The pipe is the so-called "high-test" pipe, having a minimum yield strength of 52,000 psi. It is made of manganese-steel plates measuring approximately 92 in. wide and 30 ft long. The pipe wall thicknesses vary from $^{9}/_{32}$ to $^{3}/_{8}$ in. to meet the pressure conditions of different sections. Altogether, there are 4 miles of $^{3}/_{8}$-in. thick pipe, 104 miles of $^{11}/_{32}$-in., 53 miles of $^{5}/_{16}$-in. and 53 miles of $^{9}/_{32}$-in.

From steel stock to completed 60-ft sections, there are 11 major

operations. The flow of work may be readily observed from the process diagram, Fig. 1. Traveling on a conveyor line, the plates first go to leveling rolls for the removal of waves or buckles and then to a shear, which trims the ends square and to the proper length. The next step is pictured in Fig. 2, a grit blaster which uses steel shot to remove mill scale from the edges to be welded. A strip of plate around 3 in. wide is thus cleaned, both sides at once, at a rate of about 15 feet per minute.

The plates pass on to a turntable which feeds them to the planers (Fig. 3). These 40-ft planers have a centering device to prevent too much of a cut and 20 hydraulic cylinders on either side to provide clamping power. Two planers, one on each side, move along worm gears to reduce the plates to the exact width and squareness and to bevel the plate edges for welding. A relatively small single vee is used

Next comes the Consolidated designed and built edge roll machine, which turns up both edges to a radius that will allow proper insertion in the pyramid rolls. The plates are fed to these rolls by seven parallel feeder bars with rollers. Each of the two pyramid rolls is rough-surfaced and is rotated by a 50-hp motor. The operator directs the roll forwards and backwards in successive movements until the plate has been rolled to proper cylindrical shape.

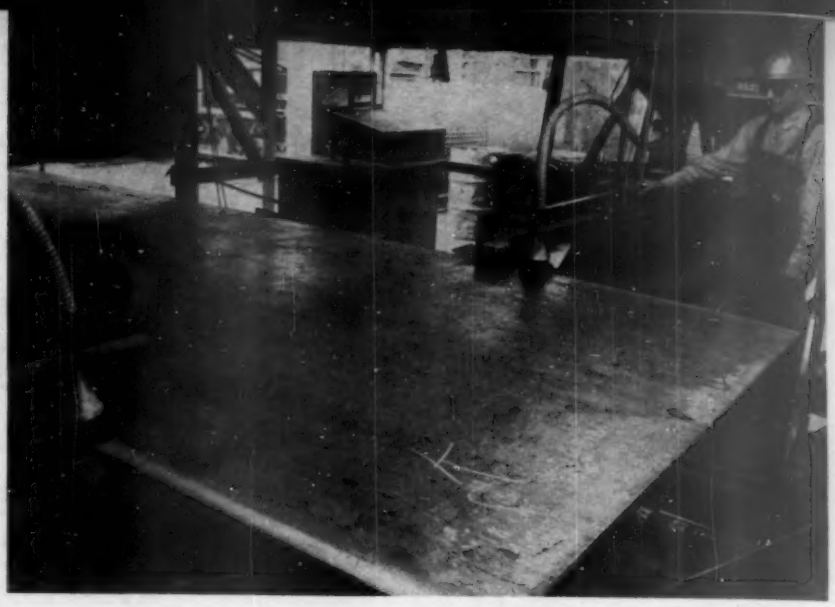


Fig. 2—Grit blasting both edges of the plate to insure clean surfaces

Leaving the rolls, the cylinders are pulled by cable to a conveyor that travels at right angles to the previous direction of work flow. They are carried to a bank of continuous seam welders, where the production line divides into five streams for welding of the longitudinal seams by the submerged-melt process.

Two of these five special seam welders are shown in Fig. 4. The entering cylinder is engaged by overhead rollers, sprocket and chain driven, which keep it moving. In traveling the 20 ft to the welding head, the cylinder is guided and slightly compressed by four sets of side rollers on each side, below the center line.

When a pipe cylinder enters one of these tube mills, its edges are spaced sufficiently far enough apart to clear a thin metal support, on the forward end of which is the 12-in.-long back-up shoe. At the point where the submerged-melt welding takes place, there are thirty 1¼-in.-diam rollers on each side below to join with other rollers on top to hold the pipe in precise position as it is being welded.

Exact positioning and alignment before, during and after travel below the welding head is effected by means of continuous chain rollers running longitudinally with

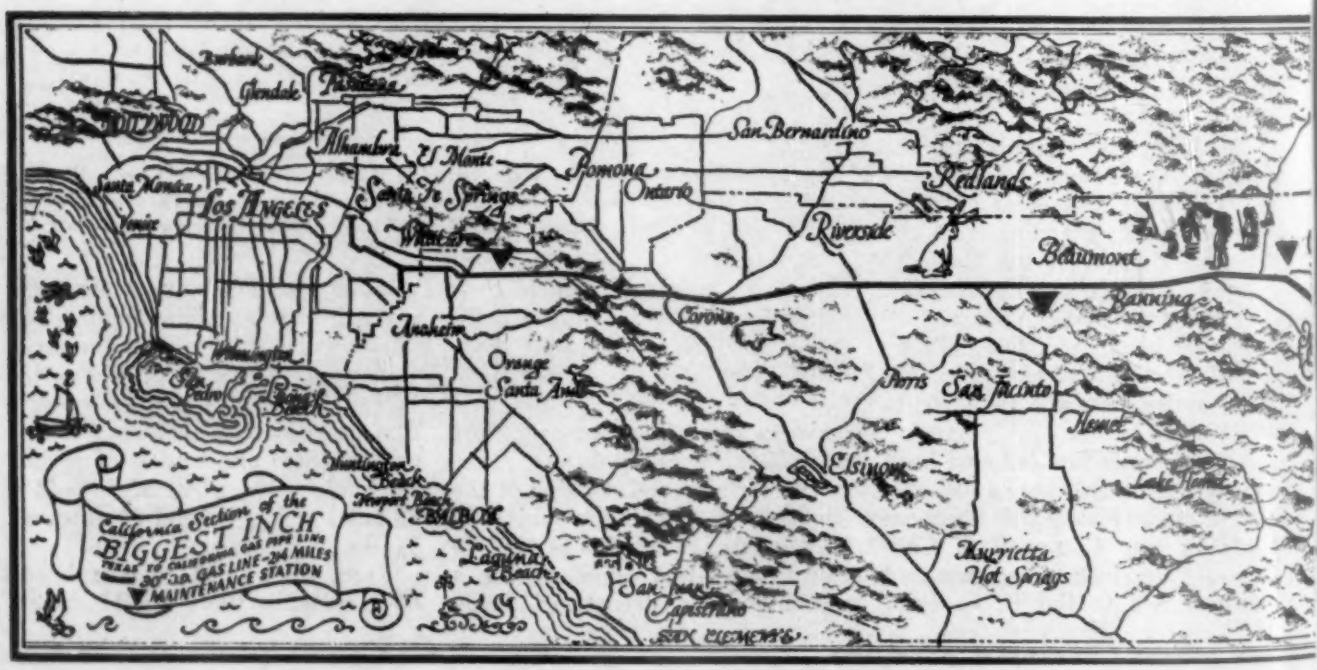


Fig. 3—These 40-ft planers trim the plates and provide edge preparation

the pipe. These are carried in the yoke in three frames: one beneath the pipe and two on the sides above the horizontal axis. One of the upper sets of positioning chains may be seen clearly in unit no. 3511 in Fig. 4. There are seven chains to the frame with 24 rollers in each to contact the pipe as it travels. Any desired increase or decrease in the pressure of the rolls against the pipe can be obtained with a manual screw adjustment.

While on the roller conveyor tables, before being fed into the welding machine, tabs of 5 by 9 in. plate are tack welded to each end and on either side of the open seam. This is done so that the submerged-melt welding will neither start nor stop on the pipe itself, and so welding will be wholly uniform throughout the length of the seam. The tabs are flame-cut from the pipe after they have served their purpose.

Submerged-Melt Welding

For the benefit of readers who may not be familiar with the details of submerged-melt welding, the writer appends a full description of the welding operation. The edges are progressively fused together by means of heat generated by the passage of a heavy electric current between a bare welding electrode and the work. For this heavy weld, a double electrode is fed from two 150-lb rolls of wire. These electrodes are not in actual contact with the work, but the current is carried (or arcs) across the gaps through a special granulated material of finely crushed mineral composition. In its molten state, this granulated flux becomes a highly resistant conductor of current.

Since the granulated material is a non-conductor of electricity when cold, it is necessary to provide an initial conductive path for the current. This is done by placing a small piece of steel wool between the end of the electrode and the work; the heat generated by the initial flow of the current through the steel wool will melt the lower portion of the "melt" and allow welding to begin. Once started, the melting of the granulated flux is self-continuous.

The flux is fed by gravity from an overhead hopper and falls just ahead of the ends of the electrode wires and on the edges as they are drawn together. It covers the electrodes deeply so that the entire welding action is submerged and there are no sparks, spatter, smoke nor flash.

Directly above the finished weld surface, there forms a solidified

This is the route traversed by the California section of the "Biggest Inch" natural gas pipe line—214 miles across desert and orange groves

Fig. 4 (right)—Two of the five tube mills which weld the longitudinal seams by the submerged-melt process. Note the tabs welded onto the ends of the pipes and the positioning chains and rollers on unit No. 3511

Fig. 5 (below)—Hydraulic expander. At the left is the movable head. The ram moves in slightly as the length of the pipe decreases during expansion to its exact 30-in. diameter

coating of fused slag. Much of this thin slag layer pops off as the pipe cools and contracts, and the rest can easily be knocked off. Above the slag is left a much thicker deposit of unfused flux. Since this is unchanged chemically, it is drawn off by vacuum suction and returned to the supply hopper for re-use.

About nine minutes are required to complete the welding of one longitudinal seam, a rate of speed comparing very favorably with that of flash welding on pipe of smaller diameters. The intense, concentrated heat provides an unusually deep fusion into the base metal. Because of the small vee and the flat position of the seam, which prevents the molten metal from flowing out of the welding zone, nearly two volumes of base metal are fused for each volume of electrode added.

Besides shielding the weld from atmospheric oxidation, the granular flux acts as a cleanser, absorbing impurities from the fused metal. This leaves the weld metal clean and dense, with properties of unusual strength, ductility, shock resistance, uniformity, low nitrogen content and corrosion resistance. All of these characteristics are essential in pipe made to carry gas at high pressures.

Hydraulic Expansion

The mathematically inclined reader has probably noticed that the plate width was given as 92 in., and that this does not jibe with π times the 30-in. diameter. The reason for the discrepancy will now be explained. In the next operation the ends of the cylinders are mechanically stretched in an end expander to 30-in. diameter. At this point the pipe is of 30-in diameter only at its ends, smaller in between. The conveyor line now divides into two streams to carry the pipes to the expanders

One of two hydraulic expanders which stretch each length of pipe to exact diameter is shown in Fig. 5. The pipe is clamped between dies of the required 30-in. diameter. One end of the expander is fixed, the other is adjustable by means of a ram. There are heavy rubber gaskets at both ends. The pipe is pumped full of water (about 1,000 gal) with a low-pressure pump. Hydraulic pressure is then built up, using 3-cylinder reciprocating pumps, to expand the pipe to its full 30-in. diameter from end to end. The length of the pipe decreases slightly during the expansion, but this is taken care of by the movable end of the machine.

One of the benefits of the hydraulic expansion is that the stretching or cold working of the steel materially increases its yield strength so that a thinner wall may be used for a given pressure. A second advantage is that the expansion of the pipe to fit the truly cylindrical die results in uniform roundness and straightness. Finally, the stretching of the pipe automatically tests the strength of the welded seam at the yield strength of the parent plate.

Circumferential Welding

Hydrostatic testing is accomplished after expansion, on the same machine. It is only necessary to drop the expanding pressure about 30% and open the dies for visual inspection of the seam and hammer testing.

Fig. 6—The end facer prepares the pipe for circumferential welding. One end is beveled for automatic welding in the shop and the other for manual arc field welding

Fig. 7—Circumferential welding is also done by the submerged-melt process. The operator is knocking off the fused melt as the pipe rotates to complete the seam

The pipe sections are next conveyed to the end facer (Fig. 6), a machine planer which squares the ends and bevels them for circumferential welding. The machining is slightly different on the two ends. One end is prepared for the submerged-melt circumferential welders in the shop, which join two 30-ft sections into a 60-ft shipping section. The other end is prepared for field welding by the manual arc process.

Fig. 7 shows how the submerged-melt process is used in the circumferential welding. The two pipe sections are fitted together and held into position by a back-up ring, which is expanded against them by an operator who has crawled into the pipe for this purpose. The welding head remains stationary while the pipe rotates. The granulated flux is fed down along the seam in advance of the electrode wire. Two little sharp-edged wheels, located ahead of the flux feed, position the operation as the pipe rotates. After completion of welding, the back-up ring is unloosened and removed. The 60-ft section then moves on to an inspection station and afterwards to a rotary brush that thoroughly cleans the inside surface.

After undergoing final inspection, the welded sections are blasted, primed, coated with coal tar and wrapped with asbestos felt. They are then checked with a Holliday detector (Fig. 8), an electric device which registers any break in the spiral asbestos-tar wrapping or lack of proper coverage. This precaution is necessary to insure gas tightness. Finally, they are loaded, six sections at a time, into trucks and trailers for hauling to the field site.

Fig. 8—The welded sections are coated with coal tar to insure gas tightness and spirally wrapped with asbestos felt. The wrapped pipe is checked with a Holliday detector, which registers any break in the tar-lined wrapping

Throughout all of the operations from the steel mills to the completed line, careful records, tests and checks are made to maintain a properly high standard of quality. Among other precautions to insure a perfect job, approximately 10% of the field welds are X-rayed—one weld per weldor per day.

The total weight of pipe in the 214-mile line will be in excess of 60,000 tons. When it operates at its ultimate capacity, 305 million cu ft per day, the weight of gas daily carried in the line will be approximately 7,625 tons. In one month the weight of the gas that passes through the line will equal three times the weight of the pipe and valves.

Open-Circuit Voltage

The history of a-c welders is the story of a continuous effort to secure lower open-circuit voltages. In the earliest days, it had to be 150 volts; in the middle period, 110 volts. Using a stabilizing capacitor, it is now possible to operate at an open-circuit voltage of 55 volts.

BY C. P. CROCO
Manager, Welding Dept., Motor Div., Westinghouse Electric Corp.

ABSENCE of arc blow, lower power consumption lower maintenance costs are three advantages of a-c welding. The absence of arc blow when using high currents and when welding in corners is an advantage that has been recognized for some time. The efficiency of a transformer compared to a motor-generator set as a means of changing electrical energy to the proper volt-ampere characteristic for arc welding is a real electrical advantage, as is illustrated in Fig. 1. The maintenance requirements of a transformer with no moving parts are obviously less than a motor-generator set with its rotor, shaft, bearings and brushes.

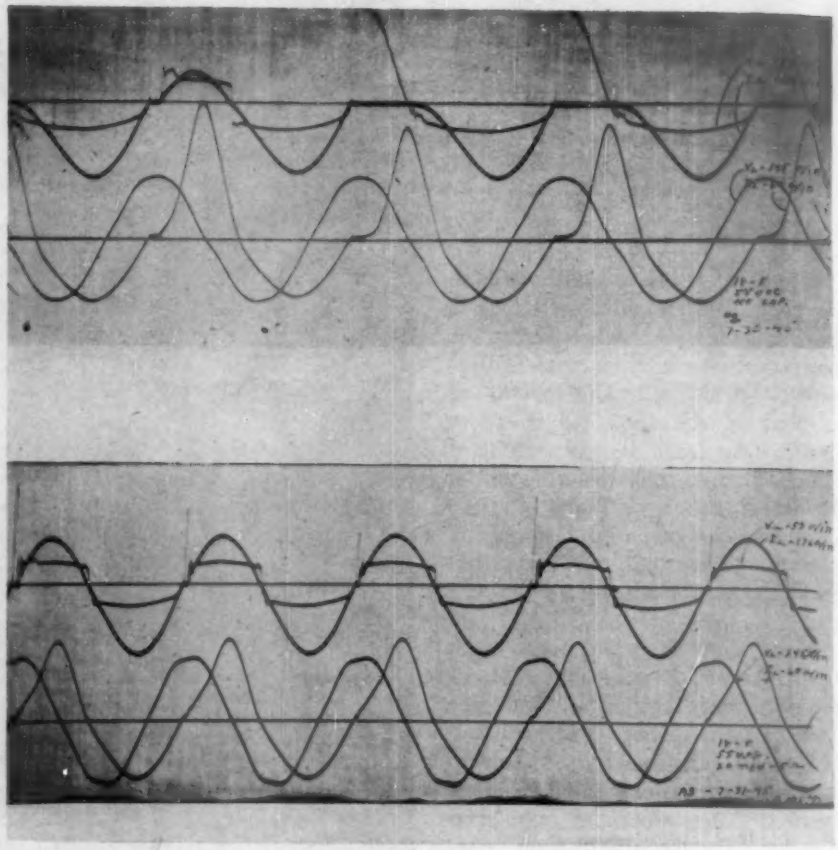


Fig. 2—Oscillographs showing the effect of a stabilizing resistor and capacitor on a high-frequency-stabilized welder. The upper set of curves shows the wave shapes during welding without the stabilizing circuit; the lower set the wave shapes during welding with the stabilizing circuit

BARE-ELECTRODE DAYS

Early attempts to introduce a-c arc welding failed because of the lack of a suitable electrode. Bare wire electrodes required a high voltage to prevent the arc from being extinguished and to insure re-establishment of the arc as the current passed through zero. With any voltage under 150 volts, except on very large electrodes, the welding current and arc would not be re-established. The possible hazard from such a high open-circuit voltage was the reason most manufacturers decided not to put an a-c welder on the market.

As early as 1907, Kjellberg began to experiment with a coated electrode. This was followed by a whole series of developments by Cravens, Smith and others, but, unfortunately for a-c arc welding, all their efforts were devoted to making an electrode coating of cellulose mixed with sodium silicate. By 1932 this work had resulted in a good reverse-polarity d-c electrode now known as AWS E-6010. It took several years more for engineers to discover what was required to make a good a-c electrode.

As early as 1919, Westinghouse had built an a-c welder which had an open-circuit voltage of approximately 125 volts. As a result of tests on this unit it was concluded that an open-circuit voltage of roughly 125 volts over the entire current range was required for acceptable welding performance with the lightly coated electrodes then available.

In 1929 another a-c welder was made suitable for use with bare wire electrodes by the addition of a high-frequency stabilizer. This welder, frankly an experimental

* Abstract of a paper, "Coordinated Development of A-C Welders and Electrodes," presented to the American Welding Society at Oakland, Calif., in connection with the Western Metal Congress.

Goes Down*

★ RESEARCH

model, was built for a maximum rating of 1,000 amp. In 1931 a 50 to 200 amp design appeared with a tapped transformer and a high-frequency stabilizer of the shunt-coil type. These welders are of particular interest because with high-frequency stabilization a welder with less than 100 open-circuit volts could be used with bare and lightly coated electrodes.

Two Early Welders

The success of the Babcock & Wilcox Co. on their Class I welding on the Boulder Dam penstocks resulted in an overnight swing to a-c welding among large welding shops. Most plants had to develop and manufacture their own electrodes. A larger welder was developed for 110 volts which would work fairly well with the early coated electrodes. The first one built was for 750 amp and the current control was obtained with an adjustable leakage core. A three-legged transformer was used with one adjustable leg. The primary was wound around one leg and the secondary around the same leg and the moving core leg. This established an adjustable leakage path between the two windings. Later a 500-amp welder was developed. The high open-circuit voltage of these two welders was objectionable from the standpoints of safety and high kva input at low power factor.

Reduced voltage controls for cutting the open-circuit voltage down to 35 to 40 volts were developed but, at best, were too complicated to be more than a safety device that would be later discarded.

A coated metal electrode was approved for Navy use as early as 1932, but it was not until 1936 that an improved form became available as the present E-6020 electrode. This proved to be an excellent a-c electrode for downhand welding, and it operated very well with open-circuit voltage as low as 80 volts. It was followed by the E-6012 electrode in the same year, which can also be used successfully on alternating current.

During this period, new a-c welders were developed for open-circuit voltages of 75 and 80 volts. The first adjustable-core, reactor type of welder was the result of this development.

First Low-Amp Welders

The popularity of the all-metal automobile body led to the demand for a low-amperage welder. First the designers used high-frequency stabilization to meet this need, but the series of experiments made

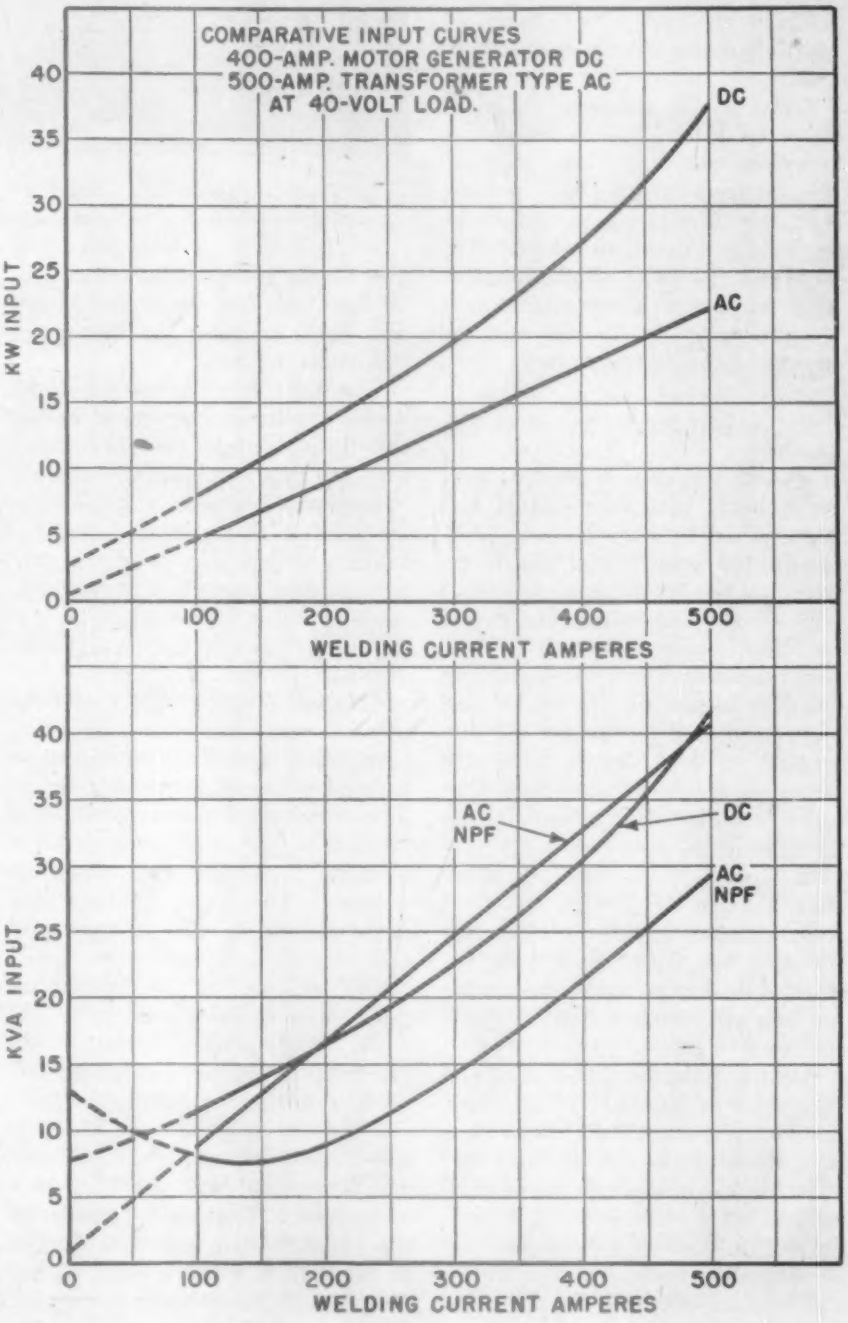


Fig. 1—Comparative efficiencies of a 400-amp motor-generator d-c welder and of a 500-amp a-c transformer welder

during 1938 that resulted in the E-6013 electrode practically put the high-frequency-stabilized welder out of the running. This electrode would operate on open-circuit voltages as low as 50 volts, and it greatly increased the demand for small 100 and 200 amp welders that could be used in sheet-metal shops and garages.

The 100-amp welder was at first made with 50 and 55 open-circuit voltages and was of the tapped secondary type with a separate built-in reactor. Later the voltages were raised to 65 and 80 volts on the intermediate and lower settings so that other types of small-diameter electrodes could be used.

Only an all-position, high-ductility a-c electrode was needed to complete the line. The work on this electrode was finished in 1943, when the E-6011 electrode became available. Further development of stainless and alloy electrodes suitable for a-c welding meant that the process could now be used for practically all types of work.

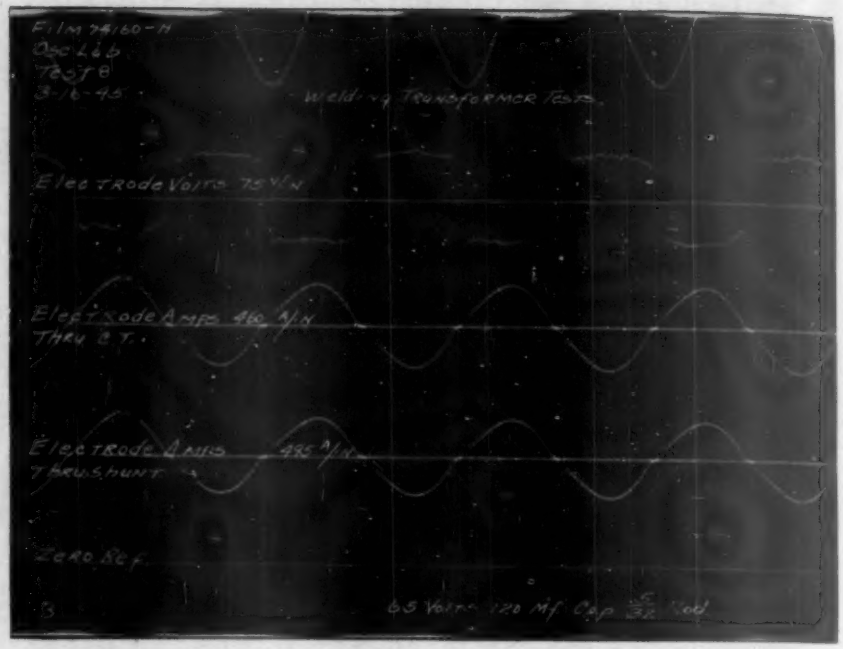


Fig. 3—Oscillograph of stabilizing capacitor on a 300-amp welder. Note the similarity to the wave shapes shown in the lower half of Fig. 2

Limited-Input Welders

At this stage, most welders were being made with open-circuit voltages of 70 to 80 volts. In 1945 the limited-input welder was developed for the small shop and farm with arc-striking voltages of 50 and 65 volts. This reduction in voltage has resulted in a corresponding decrease in size of the welder and a proportional reduction in the amount of kva drawn from the power line. A further reduction in kva requirements is made by the use of built-in capacitors for power-factor correction. The combination of these two design factors—reduced open-circuit voltage and power-factor correction—has resulted in a higher maximum welding current output for a given limited kva input.

Although the limited-input type of welder is limited to use with low-voltage stabilized electrodes, its usefulness is not thereby restricted to mild-steel electrodes. Several other electrodes have been developed and are available for welding alloy steels, stainless steels, cast iron and for hard-facing. Except for the stainless-steel electrode, all the rest are the same as are now being supplied for the regular industrial market.

The use of a carbon-arc torch with stabilized electrodes makes the limited-input welder suitable for welding aluminum, copper, brasses and bronzes. The carbon-arc torch also provides a tool for brazing, soldering, heat forging, preheating and tempering operations.

The NEMA Standard

Efforts on the part of several utilities, rural co-ops and the REA to regulate and limit the applications of arc welding on their power lines brought the attention of NEMA to the need for a uniform standard covering this class of welders. This new standard was developed to cover 130-amp and 180-amp welders having an open-circuit voltage not to exceed 65 volts and a load voltage of 25 volts. The primary voltage of this type of welder was to be 230 volts and the maximum line circuit was to not exceed 37.5 amp when operating at maximum secondary current and 25 volts secondary load. This was considered the maximum current that should be taken from a 3-kva single-phase transformer being used to supply power to one customer. The load duty cycle was established at 20% or 2 minutes operation in every 10 minutes.

It should be understood that, up to the maximum rated current, this welder will do anything that a similar industrial welder will do. The only limiting factor is the amount of time that it can be loaded during any 10-minute interval. For the small shop or farmer, this should not be considered a handicap. If the operator attempts to weld at a higher rate, the circuit breaker will automatically protect the windings against overheating.

To determine whether electrodes having suitable characteristics were available for use with a welder of this type, mild-steel, hard-facing, stainless-steel and cast-iron electrodes from a large number of manufacturers were tested at various open-circuit voltages from 80 to to 44 volts. These tests showed that suitable electrodes were commercially available from a number of suppliers. The difficulties of starting the arc with a new electrode and with a used electrode on clean and dirty plates were also tested; and the ability of the operator to weld without arc outages was tried with satisfactory results.

Meanwhile, the industrial welders were being made with 70 to 80 volts open-circuit voltage. A complete line of welders from 100 to 1,000 amp are now available, and the open-circuit voltage and arc characteristics are pretty much standardized.

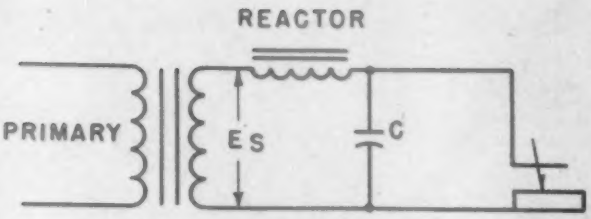
Inert-Gas Arc Welding

Late in 1942 experiments were made to determine the feasibility of using an a-c welder with high-frequency stabilization for inert-gas-shielded arc welding. The use of d-c gave poor welds because of the tendency of the tungsten electrode to mushroom. Another disadvantage was the fast rate of consumption.

It was found that an a-c welder with a stabilizer reduced tungsten consumption and produced very good welds. The current had to be watched to see that it was not too high for the welder rating. Due to rectification, only about 70% of the rating of a welder was available without overheating.

The two disadvantages of the high-frequency-stabilized welder are the tendency to rectification and radio interference. Radio interference can be localized and reduced to a tolerable degree by placing the primary wiring to the welder in conduit and by shielding the area surrounding the welder and welding leads. The shielding effect of a steel-frame building is ordinarily sufficient.

Because the positive and negative arc characteristics are very different, partial or complete rectification of the arc current may occur. Partial rectification results primarily from the lower average negative arc voltage and results in a d-c component. This component, although detrimental to the operation of the transformer, is apparently beneficial from a welding standpoint. Rectification has been reduced to a minimum by changing from a parallel to a series oscillator circuit coupling and by using a capacitor and resistor combination for further arc stabilization. Fig. 2 shows the effect of this stabilizing circuit on wave shapes. Some rectification is desirable, since the small positive half cycles are sufficient to rupture the film on the metal, while more positive current would increase electrode consumption. Most of the heat for welding is put into the metal during the negative half cycle.



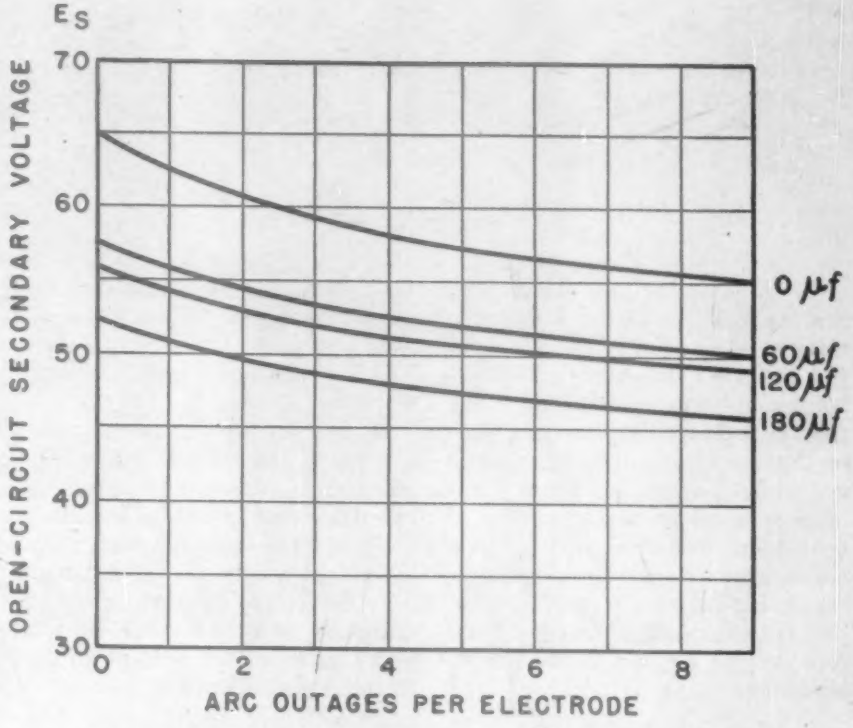


Fig. 4—Effect of different values of capacitance, ranging from 0 to 180 microfarads, on the arc outages for various open-circuit voltages

Stabilizing Capacitor

Something was needed that would help stabilize the welder so that lower open-circuit voltages might be used. Investigation of the a-c welding arc with the magnetic and cathode-ray oscillograph indicated that a capacitance in parallel with the arc produces a stabilizing effect because of the extra energy delivered to the arc immediately after restriking. An oscillatory discharge from the capacitor gave results similar to the high-frequency stabilizer, as shown in Fig. 3.

A series of tests was made of different values of capacitors and different values of no-load voltages, using arc outages on a given electrode to indicate the degree of arc stability. A number of electrodes were tested at each of a number of transformer no-load voltages. The tests were repeated with different values of capacitances, as shown in Fig. 4. By extending the curves to zero, the value of voltage for no arc outage was determined for each condition. The tests were made for various diameters and types of electrodes, and it was finally determined that a minimum voltage of 55 volts was satisfactory with a 120-microfarad capacitor.

IAA Meets in Cincinnati

Good material, ably presented, marked the 47th annual convention of the International Acetylene Association. Here is a play-by-play account of the two-day meeting.

BY CLYDE B. CLASON

CINCINNATI was the place, May 20 and 21 the time for the forty-seventh annual meeting of the International Acetylene Association. Much broader in scope than the one-day business meetings of the war years, this was a true convention, featuring three technical sessions at which a total of ten papers was presented. These sessions moved with clockwork precision, both speeches and question periods alike being timed to the split second by the vigilant vice-chairmen.

Official Luncheon

A luncheon at the roof garden of the Hotel Gibson opened the convention officially at 12 noon on May 20. About 200 IAA members were registered for this event. The speaker's table was well filled with distinguished personages, including the Honorable Carl W. Rich, Mayor of Cincinnati, and Dr. Raymond Walters, president of the University of Cincinnati. IAA Vice-President R. B. Swope served as chairman, and a brief opening address was made by President Glenn O. Carter.

The featured event of the luncheon was, of course, the presentation of the James Turner Morehead Medal. The 1946 award was given to Harry Campbell, chief inspector, Bureau of Explosives, American Association of Railroads, New York City, for "able administration of regulations for the transportation of acetylene and allied products." The presentation was made by C. McL. Pitts, The People's Gas Supply Co., Ltd., Ottawa, Canada.

In his acceptance speech, Mr. Campbell pointed out that acetylene should no longer be considered as a dangerous article for shipment. He said that during recent years, the maximum number of accidents per year that could be traced to acetylene was two, and that in many years no accident at all due to this cause occurred.

First Technical Session

The first technical session, held immediately after the luncheon, was also at the Hotel Gibson. Dr. J. F. Kahles, University of Cincinnati, acted as session chairman, and A. J. Fausek, Modern Engineering Co., St. Louis, as session vice-chairman. Four technical papers were presented.

W. T. Whalen, metallurgist, The R. K. LeBlond Machine Tool Co., Cincinnati, talked on the flame-hardening of machine tool parts. Any ferrous material that can be hardened by the normal furnace method can also be flame-hardened, he said, though best results are obtained with steels having a carbon content of above 0.40%. Cast irons can also be flame-hardened, but to get good uniform results the inclusion of one or more alloys in the iron is almost an essential.

R. B. SWOPE, newly elected president of the International Acetylene Association. Mr. Swope is president of the Southern Oxygen Co., Inc., Bladensburg, Md.

Eldon Hurt, development engineer, Haynes Stellite Co., Kokomo, Ind., discussed methods newly developed for mechanized hard-facing by the oxy-acetylene process. There are three types of machines now operating on a production basis: straight-line; cylindrical, where multiple rods are used so that all the hard-facing can be applied in one rotation; and spiral. In the latter, the deposit is applied as a narrow ribbon in a continuous fine pitch spiral.

Applications of flux-injection cutting to stainless steel were covered by G. E. Bellew, steel mill specialist, technical sales division, Air Reduction Co., Inc., New York City. A. F. Chouinard, manager, research and development dept., National Cylinder Gas Co., Chicago, brought the session to a close with an interesting picture-talk on foundry and forge uses of the oxy-acetylene processes.

The annual business meeting was called to order by President Glenn O. Carter immediately after the first technical session. H. F. Reinhard, The Linde Air Products Co.,

(continued on page 60)

Successful Welding Distributor Operations--3

Store-on-wheels truck developed by the Welding Supply Division of Bakersfield Machine Co. really "goes to the country" in a merchandising way.

Fig. 1—Main store building and the store-on-wheels. Left to right in the insert are G. E. Reynolds, the salesman who operates the traveling welding supply shop; Paul Meyer, founder of the business; and Wayne Crabtree, service and sales

Door to Door Selling

BY H. W. YOUNG

Previous articles in this series have dealt with distributors operating in large industrial areas. Readers have asked us about the methods of smaller distributors, those whose territories do not include big industrial centers. This article is in answer to that request. It tells how predominantly rural customers are being served by a welding distributor whose operations are as successful as any of the other distributors we have previously chronicled.—THE EDITORS.

IF A MAN is thinking of buying something—any article—he likes to see and handle it before he parts with his good money. A catalog page supplemented by a salesman's assertions that things are thus and so, no matter how sincere the salesman may be, does not always hit a responsive chord. There are also a great many people who like to buy in their own homes or business environments, where they can take their time and not have to wait in line, fidgeting impatiently from one foot to another while customers behind breathe down their necks.

Paul Meyer and Bill Holman, partners in the Welding Equipment & Supply Division of the Bakersfield Machine Co., Bakersfield, Calif., decided to capitalize on these human inclinations by keeping a part of their stock moving over the territory at all times under the direction of a competent salesman. The result was a branch store-on-wheels (Fig. 1). The old-fashioned peddler's wagon was a grand institution in its day. This modern concept of it has proved that if you streamline grandfather's selling methods you will get the same good results that grandfather did.

YOUNG MAN WITH AN IDEA

As a distributor of welding equipment, supplies and accessories. this house does a comfortable business at present, grossing around $150,000 annually. Paul Meyer started it in 1935, when he was only 18 years old and just out of junior college. This live wire obtained the agency for a large Pacific Coast manufacturer of gas welding and cutting products and put his whole time into the business of selling such equipment.

At first Paul occupied space in his father's machine shop, though his business has been kept independent and on its own feet at all times. The taking of a partner, Bill Holman, enabled stocks to be

Fig. 2—Main store city counter. Note the attractive showcase display

greatly increased. New lines were added from among the best manufacturers of arc welders, electric tools, hard-facing materials, electrode holders and clamps—everything that the trade demanded in the way of supplies and accessories. About three years ago, a building adjoining the Machine Co. was erected and equipped with modern stockroom facilities and city sales counter (Fig. 2).

When the store-truck idea was first adopted, a truck of conventional body design was employed. Recently this was supplanted by a new one with a specially designed and equipped body. Not only is the truck an aid to selling, but by delivering the merchandise sold (at the time of sale) it saves a lot of shipping costs. Large quantities of merchandise are sold out of it every day and left with the purchaser.

As seen in Fig. 3, the interior has a wide open space down the center in which heavy equipment such as welders can be carried. Along the sides are ranged open shelves and closed cupboards for smaller items, representing practically the same stock that is carried in the warehouse. The salesman is his own driver. To the right of the driver's seat there is a little "office" where all price books, catalogs, customer cards, etc., can be carried for convenient reference. Customers soon learn to climb up into the truck and shop around among the shelves just as they would in the store.

$4,000 per Day

After the new truck had been out about a month, the question came up as to how much stock it carried on an average day. Without any special stocking up, the ordinary days' supply was found to invoice roughly $4,000. Special insurance is carried on this stock.

Suppose now we meet G. E. Reynolds, salesman and driver of the store-on-wheels. He tells us that he covers all the company's territory regularly on scheduled trips and that his longest run will take him to the city of Taft, fifty miles distant. He takes in all customers and prospects on each run.

The bulk of his prospects will fall roughly into four general classifications: (1) Oil fields—Bakersfield is in the heart of some of the largest oil developments in California; (2) agricultural; (3) manufacturing; (4) welding and blacksmith shops.

The oil fields, of course, represent a very large outlet for welding supplies and equipment. Both the operators and the contractors who drill wells use a great deal of welding, largely for maintenance work. Prospects in the manufacturing field are rather limited, this not being a manufacturing center. Welding and blacksmith shops will run about as they do anywhere.

Farming Is Big Business

The agricultural field is decidedly different from that of most agricultural regions. A "farmer" may well be a large industrial customer, who spends up to several thousands of dollars a year for welding equipment and supplies alone. This is because farms here extend over vast territories, employ hundreds of people and have large shops for the repair and maintenance of farm and pumping equipment and machinery. All the large ranches are completely mechanized, with both heavy and light equipment.

The reason for these large farm units is simply that the irrigating water in this area must be secured by pumping. Of late years, the water table in the southern San Joaquin valley has been going down so that deeper and deeper pumping is constantly being required. The limit has about been reached for the small farmer, for the owner of, say, 160 acres cannot

Fig. 3—Salesman Reynolds in his "office" in the wheeled store. Reynolds returns daily to the warehouse to replenish the shelves and cupboards

Fig. 6—"We always get a good idea or two when the store-on-wheels salesman calls," says Superintendent Jackson (left) in the above picture

stand the installation cost of a deep well pump, to say nothing of power costs. Thus the tendency has been toward large farm tracts that can use the most modern pumping equipment and operate by the most highly mechanized and economical methods. Only under these conditions is farming profitable.

A trip with Salesman Reynolds to one of these large farm customers will bring out some interesting sidelights. We arrive at the property of the S. A. Camp Farm Co., not the largest in the territory by any means but a good-sized operation. Some 50 to 60 men are employed regularly to farm approximately 7,000 acres. To enter, we must first drive through a yard a couple of acres in extent covered with "casual" farm machinery that happens to be idle for the moment or is waiting for repairs and overhaul.

The shop buildings form a little community in themselves. They include a garage and shop for the repair of automotive equipment, one large main shop (Fig. 4), a small warehouse for steel and iron (Fig. 5) and one or two other miscellaneous buildings.

The main shop is presided over by R. C. Jackson, superintendent and chief weldor (Fig. 6). This shop is perhaps a hundred feet square and has complete facilities for metal cutting and machining, blacksmithing, welding and flame-cutting.

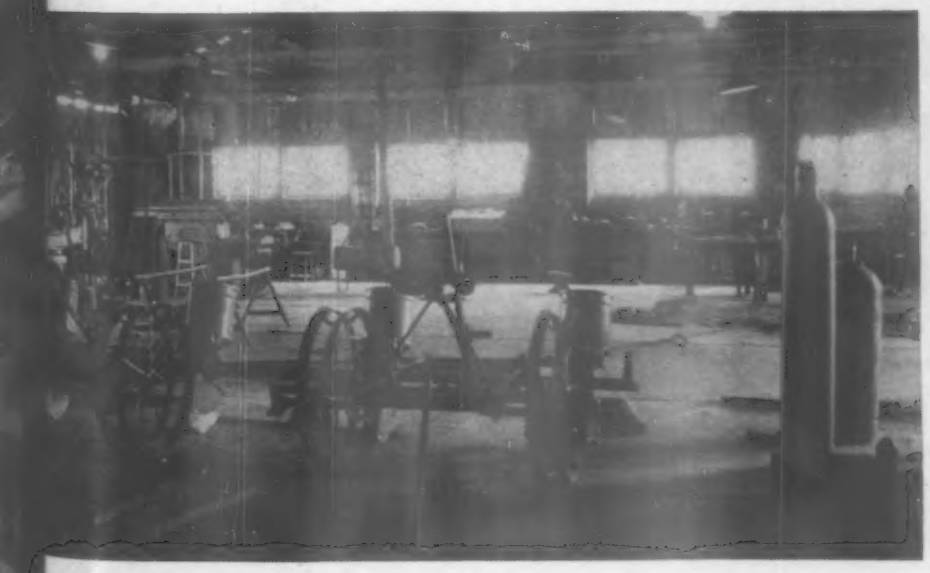
Likes the Service

"The large farmer can no more get along without welding and cutting equipment than can any other type of industrialist," says Superintendent Jackson. "One reason is we cannot afford to lay up equipment while waiting for scarce parts to be delivered. Nor is it necessary. We can torch cut a machine apart and repair or rebuild it by welding the same way and with the same facility that the big construction contractor handles his equipment in the field. With hard-facing, we can take much of the curse of wear from soil-turning and cultivating equipment.

"I might also say that it is comforting to have a good welding distributor handy, one who knows your particular problems and is willing to come out here and be of service any time. We are always glad to see Mr. Reynolds and his traveling store and we always get an idea by talking with him."

Fig. 4 (below)—Farming in the San Joaquin valley means machine shops like this one. These are large and constant users of welding

Fig. 5 (right)—S.A. Camp Farm Co. maintains this neat little warehouse for the storage of steel stock



★ PRODUCTION

BEER FROM Welded Barrels

BY EDWARD F. LEE
President, Steel Cooperage Co.

Steel barrels can do as good a job of transporting the golden malt as the hand-built casks of oldtime coopers. And steel barrels can be produced on the assembly line.

MANUFACTURE of a wooden beer barrel is a slow, costly procedure. Modern tools and methods can speed it up little from the time it used to take the oldtime cooper to build a cask. Steel barrels, however, are different. They are not only longer lasting but can be readily fabricated on an assembly-line basis. All of the latest developments of industry are applied to the production line at our Detroit plant, which is, we believe, the first of its kind specifically designed for the manufacture of steel beer barrels.

1,500 PER DAY

Modern, electronically controlled seam and spot welders, plus the use of ingenious jigs and fixtures, make possible a high-speed production with comparatively unskilled labor. We are now turning out something like 1,500 barrels per day, using three seam welders and two spot welders.

A barrel is made of two halves, each formed by deep drawing from 16-gauge, mild-steel sheet. The first welding operation is to seam weld to a barrel half a jacket half that provides a runner and chime. The jacket halves are also formed in one piece by deep drawing from 13-gauge material.

A 250-kva seam welder is used to join the half barrel to a half jacket. No preliminary tacking operation is necessary because of the tight fit insured by the precision pressing. The two components are welded between inner and outer electrode wheels of 10-in. diameter. The manner in which the jacket and barrel halves are assembled is shown in Fig. 1.

The next step is to press two jacketed barrel halves together with the proper amount of overlap. This is a critical operation, as the quality of the final seam weld will depend upon the accuracy maintained in this overlap. The assembled halves are clamped to prevent possible misalignment and tack welded together on a spot welder (Fig. 2). The clamps are then removed, and the barrel goes to final assembly.

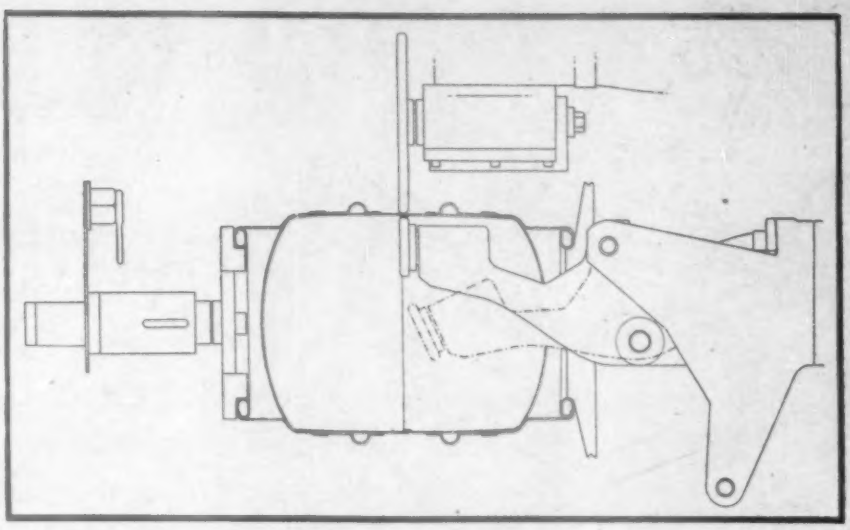
SMOOTH WELD REQUIRED

The final resistance welding operation is the most important phase of the entire fabrication. It is the center seam weld that joins the two halves together. This seam must

Fig. 1—First step in production is to seam weld a barrel half to a half of the two-piece protective jacket

Fig. 2—Tack welding the assembled barrel halves. The clamps will be removed when this operation is completed

Fig. 4—Schematic diagram of mash welding operation. Note how the lower arm of the welder is moved upward to press the small electrode wheel against barrel's inner surface



Sketch and photos courtesy Sciaky Bros., Inc.

be leakproof and structurally sound as well as perfectly smooth, without any tiny ridges or crevices to hold dirt and provide breeding grounds for bacteria. To meet all of these requirements, the final seam weld is made by mash welding.

A mash weld is a particular type of seam weld in which the amount of overlap is so small (approximately the thickness of the metal being welded) that the pressure between the electrode wheels will cause the pieces to mash together, effecting the weld edge to edge. It can readily be seen that this is a very difficult type of welding, requiring an extremely close tolerance to be maintained in the overlap. Also, the mashing tends to score the surface of the copper-alloy electrode wheels. We eliminated the last difficulty, however, by providing special knurls to dress the surfaces of the wheels while they are in operation.

The same type of 250-kva seam welder used to join the barrel half to the jacket is also used for the final welding operation. Instead of two equal-diameter electrode wheels, however, a large outer wheel and a small inner wheel are employed. The outer wheel has a diameter of 10 in. and the inner wheel a diameter of 5¾ in.

Fig. 3 shows the special fixture that is attached to the welder, and the sketch (Fig. 4) gives additional details of the set-up. The lower arm of the welder is introduced through a hole at one end of the barrel and is then moved upward to press the lower electrode wheel against the inner surface of the barrel. Special fixtures are provided for clamping and guiding purposes. A pneumatically operated clamp holds the barrel firmly against the revolving back-up. How the job looks from the outside is pictured in Fig. 5.

The plate for the open end of the barrel is arc welded into place. Arc welding is also called upon to add the fitting for the bung. The barrels are then washed and treated with acid by means of an agitating device. Finally, a special lining paint and an outside enamel are applied to the inner and outer surfaces and dried with infra-red heating lamps.

Inspection and Testing

Every barrel is inspected inside and out and is also tested under pressure and checked for correct capacity.

Structural tests are made periodically by dropping a filled barrel ten times from a height of ten feet. No resistance-welded barrel has yet suffered damage from this extreme punishment; even after the drop test, both of the joints on the jacket halves and the center mash weld remain intact.

Fig. 3—Clamping fixture and electrode wheels for the final mash welding operation (see also Figs. 4 and 5)

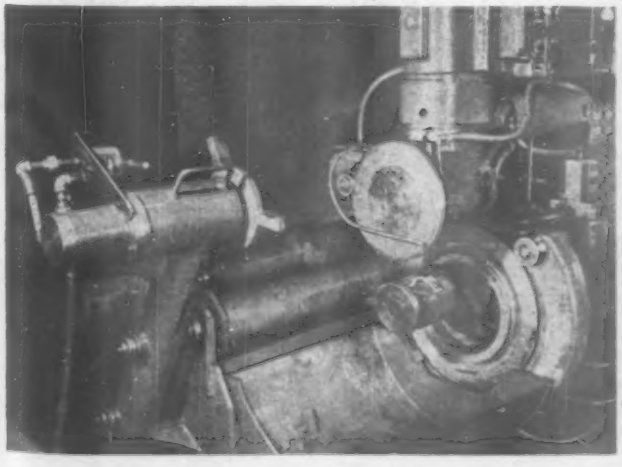


Fig. 5—Mash welding the two halves together. A mash weld is a seam weld which has practically no overlap

SHIP

BY
LOUIS M.
FRIEDMANN

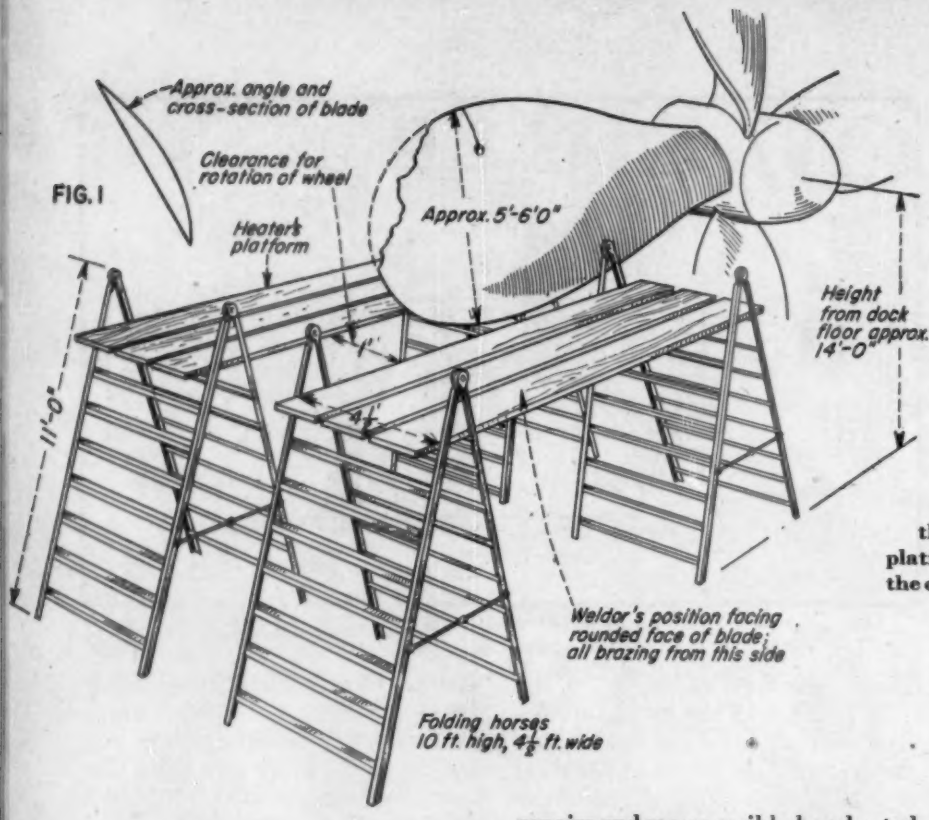


FIG. 1
Approx. angle and cross-section of blade
Clearance for rotation of wheel
Heater's platform
Approx. 5'-6'0"
Height from dock floor approx. 14'-0"
11'-0"
4'
Welder's position facing rounded face of blade; all brazing from this side
Folding horses 10 ft. high, 4½ ft. wide

Fig. 1—Staging was built up around the propeller to form convenient working platforms on either side of the blade. Note the clearance left for rotation of the "wheel"

DURING the rush of war days a floating drydock would have ships scheduled for weeks and months ahead. Hence all underwater line work had to be done with a particular ship's time on the drydock well in mind. Her refloating hour, set for the changing tide, was a deadline which had to be met.

Inspection seldom found propellers in good shape. The countless hours of steady churning on trips that sometimes took the ship around the world had left their mark. The blades were bent—cracked—with nicks and chunks missing. At times electrolytic action had eroded large patches to a spongy, worthless section.

Ship propellers, it should be noted, weigh 6 to 16 tons, all bronze. Replacements often being out of the question because of lack of time or shortage of bronze, the task of repairing a damaged propeller was developed into a set pattern that would permit the deadline to be met while doing a sound job.

In the following paragraphs the writer will try to outline the methods used on nearly 1,000 ships repaired in one shipyard during a period of 3½-years. These methods are still being followed in ship repairs and may possibly be adapted by those undertaking other large brazing jobs.

Preliminary Positioning

As a rule, the hub of the propeller is approximately 14 ft up from the dock floor, and the four blades are at various angles. The first step on the job was to see that the blade with the most work on it was turned into the easiest position for brazing. In general, the "wheel" could not be turned once it was in place because the main engine repair work was being done simultaneously with the propeller repairs. Both brazing time and scaffold building were conserved by placing the wheel in the proper position the first time.

The riggers' crews next set up the necessary scaffolds and staging and placed oxygen and acetylene tanks nearby. Whenever possible, the staging was placed to bring the work platforms to a convenient level on each side of the blade.

As shown in Fig. 1, enough clearance for blade rotation was left between the two platforms. This was an important safety measure, for all too often various crews working on engines or shafts inside the ship would forget about the propeller work being done outside and turn the wheel. This mishap happened to us several times, but the harm was fortunately confined to smashed and splintered scaffolding and damaged equipment. No serious personal injuries took place. Whenever scaffolding had to be built between and around blades, we took every precaution to see that ladderways were easily accessible.

Fairing up the blade (straightening bent tip ends) was the next step. By heating the blades with oxy-acetylene torches and the use of backing bars and large and small wooden mallets, the correct contour was restored without too much difficulty in cases of moderate damage.

Damage which required brazing could be divided into three groups: minor, moderate and major. Minor work averaged about 15% of the total brazing done. The moderate jobs, requiring drilling, chipping and the use of one or two heating torches, consisted of 70% of the work. Heavy damage, necessitating the removal of the wheel from the shaft onto the drydock floor for extensive preparation and brazing, was confined to the remaining 15%.

Minor and Moderate Damage

Short cracks (less than 6 in. long) at edges of the blades, small nicked-out pieces and surface cracks caused during the straightening of the blades constituted the minor work. These jobs required no preparation other than the backing of the crack with a carbon block

PROPELLERS

★ MAINTENANCE

Repaired by Brazing

A damaged propeller blade around 10 ft long and varying in thickness from a thin edge to 3 in. is no easy task to repair. Mr. Friedmann gives the full details of the procedure developed at one large shipyard.

and the melting out of the break until sound metal was reached. Melting was done with a heavier flame on the welding torch, using an excess (slight or moderate) of oxygen. This procedure made possible uniform bonding on both sides and allowed an easy flow of metal against the carbon backing block.

A crack running longer than 6 in. was drilled to prevent it from opening further (Fig. 2). Beveling —whether by flame-cutting or with the chipping gun—was done only from the rounded side of the blade and was continued until "showing light" throughout the entire length. The only exception to this very open type of beveling occurred near the thin edges of the blade. Here beveling would not start until the bronze was over ½ in. thick, about 2 in. from the edge.

When the chipping gun worked near the end edges of the blades, the use of a backing bar increased the cutting speed and also lessened the chances of breaking off thin and brittle sections.

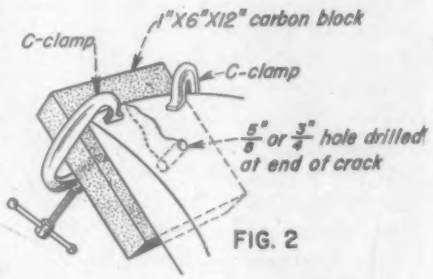


Fig. 2—Method of clamping carbon backing block to the tip of the blade for repair of a small crack. The hole drilled at the end of the crack should clear on both faces of the blade

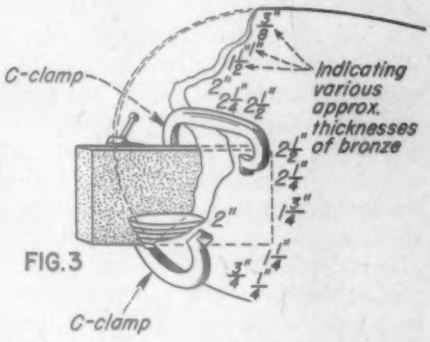


Fig. 3—How a lost edge is restored. A bronze wire is bent to outline the edge. The weldor keeps closely to the blade contour and thickness, leaving only a small excess of metal for finishing

Problems of Preheating

As bronze is a good heat conductor and as the work was done outdoors at the water's edge (where in wintertime the wind has a "running start" before it hits anything), the distribution of expansion and contraction strains necessitated a little extra consideration. Regardless of the blade position, all brazing proceeded at all times from the end of the crack towards the outside edge of the blade. It was thought wise, especially in winter, to heat the area to the nearest perimeter in order to prevent locked-in expansion.

As brazing started, the job of the "heaters" was to bring and keep the welding zone at proper temperature, using one or more torches as required. Heaters were also expected to keep the heat properly distributed, to keep C-clamps tight on the carbon blocking and to warn the weldor whenever the bronze was running to waste. In very cold weather, the blade section not in the work zone was loosely wrapped with a sheet of asbestos paper and topped with a small canvas.

Brazing in the vertical position progressed from bottom to top in 6 in. steps. Brazing material was first deposited in generous excess of needed width and thickness and was then "washed off"; *i.e.*, excess metal was melted off to very near requirement, leaving just enough extra metal for surfacing.

Fig. 3 shows the procedure for restoring a blade edge to proper contour with propeller in the vertical position. A ¼-in. bronze wire was bent to outline the edge and used as a template. The build-up was carried to the width of the carbon and was flushed off with the torch to near the proper thickness and edge. The block was then moved up and reclamped, using the other side of it for back-up. The weldor changed tips as needed and preheating was done with as many torches as required.

Oxygen and acetylene tanks were often connected in manifold units, especially during the winter. Most moderate-sized jobs were accomplished with one heating and one welding torch. When all four

blades needed brazing, two teams of two men each would work two blades at horizontal level, keeping free and clear of each other. In actual brazing time "moderate damage" jobs ran from 2 to 24 hours per ship, depending on the number of blades damaged. Heating torches were always used with extension pieces. Welding tips ranged from No. 6 (0.067 in. orifice) to No. 12 (0.125 in.).

Before discussing the procedure for propeller jobs involving extensive repairs, let us first review a few simple physical facts. The melting point of bronze is approximately 1,700 F; its tensile strength at 750 F drops to 26%, at 925 F to 18% and at 1,000 F to zero. Propeller bronze 2 to 3 in. thick absorbs and distributes a tremendous amount of heat. When a crack runs into the center part of the blade, therefore, it is only common sense to think of the amount of heat that will reach the remaining sound cross-section and of the offbalanced weight and strain upon it due to the pitch of the blade.

On deep fractures running to any extent into the blade, it has been found good practice to remove the wheel from the shaft onto the drydock floor to work in the flat position. Fig. 4 illustrates a typical procedure.

The floor, being of wood, was protected from the heat with asbestos and sheet metal in the work area. The propeller was lowered so as to rest on the hub with the flat sides of the blades underneath. The hub was tilted to suit the blade to be brazed and blocked solid while the other blades were being shored snug.

The crack was beveled from the rounded top to an angle of approximately 35 deg. The bottom of the crack should be extremely thin, preferably "showing light."

The weight of the hanging section was taken by an adequate number of columns built of fire bricks two square. A tight-fitting row of interlapping carbon blocks was then wedged, blocked and fire clayed solidly along the full bottom length of the crack. A stopper block at the edge completed preparations.

The number of blocking points depends on the depth of the break and the weight on the far side of the break from the hub. Steel pipe can be used instead of carbon blocks if asbestos shims are inserted to break the metal-to-metal contact.

On the particular job discussed, preheating was done with six heavy-duty torches with double head extensions. The heaters started at the thin end section of the blade and worked inward slowly, constantly moving their torches in a sweeping back and forth motion. When the whole blade had been safely expanded, two torches (along with the weldor's torch) moved to the center of the blade, while the remaining four moved back and forth along the outside edges.

Brazing started at the drilled hole (1-in. diam). Once a molten puddle was running and a good bonding layer covered the first 12 in. laid down, chopped-up pieces of ¼-in. brazing rod and flux were thrown into the puddle by helpers as the weldor progressed with the fill, which was 2½ to 3½ in. deep. The work was done in steps of 10 to 12 in., each step being "washed off" to finish before the weldor moved on. Heat was slowly cut down as the welding neared the thinner edge section.

When the brazing was completed, the whole blade area was reheated to an even dull-red color and tightly covered with asbestos to cool. No warpage or buckling was found in the blade when it was uncovered after cooling. The propeller was then turned over, and the excess weld metal was chipped and sanded off on the carbon-blocked side in order to complete the job.

An almost identical set-up was used for heavy damage caused by electrolytic action. This work, however, was always in the thin end section, so the brick columns wedged a ¼-in. asbestos board tight to the blade bottom. Spongy, eroded layers were chipped away, and the lost metal was then restored by building up a padding. Since the work was in the flat position, experienced weldors had no difficulty whatsoever.

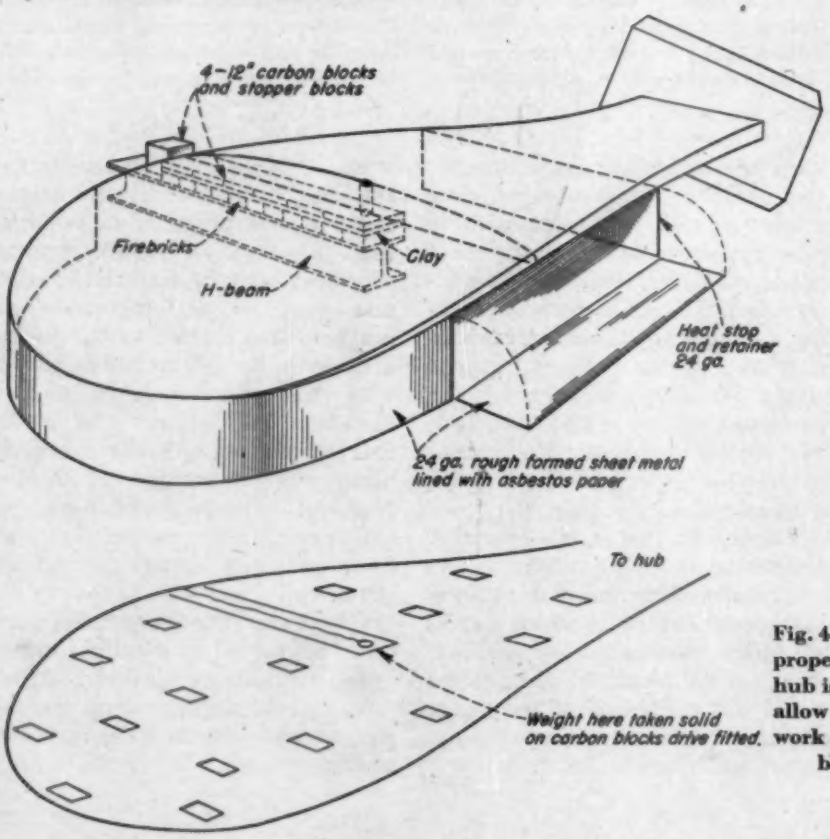

4–12" carbon blocks and stopper blocks
Firebricks
Clay
H-beam
Heat stop and retainer 24 ga.
24 ga. rough formed sheet metal lined with asbestos paper
To hub
Weight here taken solid on carbon blocks drive fitted.

Fig. 4—This is how a blade is blocked when the propeller has to be taken from the shaft. The hub is tilted as desired and blocked solid. To allow slow cooling, the "doors" in the brickwork are closed and sealed, and the top of the blade is heavily covered with asbestos

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TRADE MARK

Plug-Welded Dipper Joints

★ PRODUCTION

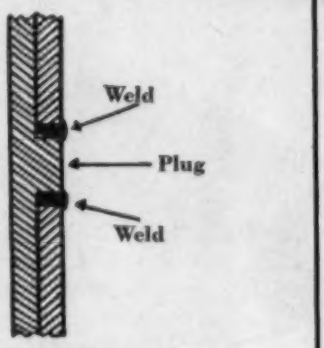


Fig. 1—Cross-section showing plug-welded construction of dipper joint

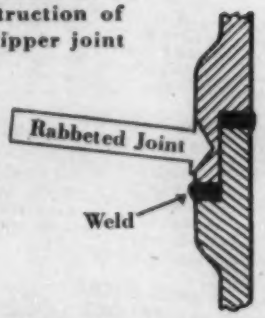


Fig. 2—Cross section showing rabbeted overlap

Patented interlocking joints assure a truly "streamlined" condition in these welded power shovel dippers. Whether made in two or in four pieces, the body is as strong and homogeneous as if cast in a single piece.

BY T. A. RATKOWSKI

Chief Engineer, American Manganese Steel Div. of American Brake Shoe Co.

WELDED dippers for power shovels have proved their worth under a variety of service conditions during recent years. Their lighter weight means heavier payloads.

In the production of welded dippers of manganese steel, the Amsco Division of American Brake Shoe Co., Chicago Heights, Ill., combines plug welding with a patented interlocking joint design. This not only provides stress-resistant welds but also eliminates any jutting shoulders that might offer resistance to penetration, loading and dumping. The term "streamlined" has been much overworked, but it is literally true of these particular types of joints.

How They Are Made

The principle behind the assembly of the dippers is that of overlapping and then welding the cast components. Plugs in one casting fit into sockets in the overlapping casting as shown in Fig. 1. Overlapping portions are rabbeted for interengagement as shown in Fig. 2. In both cases grooves are left to receive the weld deposit. Consequently, the body of the dipper is as strong and homogeneous as if cast in one piece. It is possible, however, to remove a worn front and reweld a new one in place without destruction of the back portion.

Welding is done by the manual arc process, using large-diameter

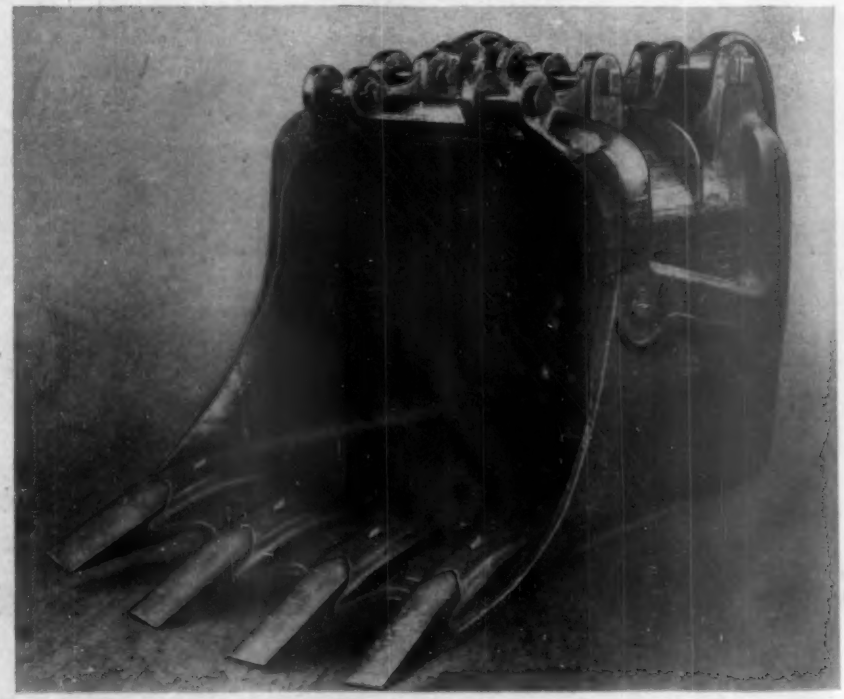
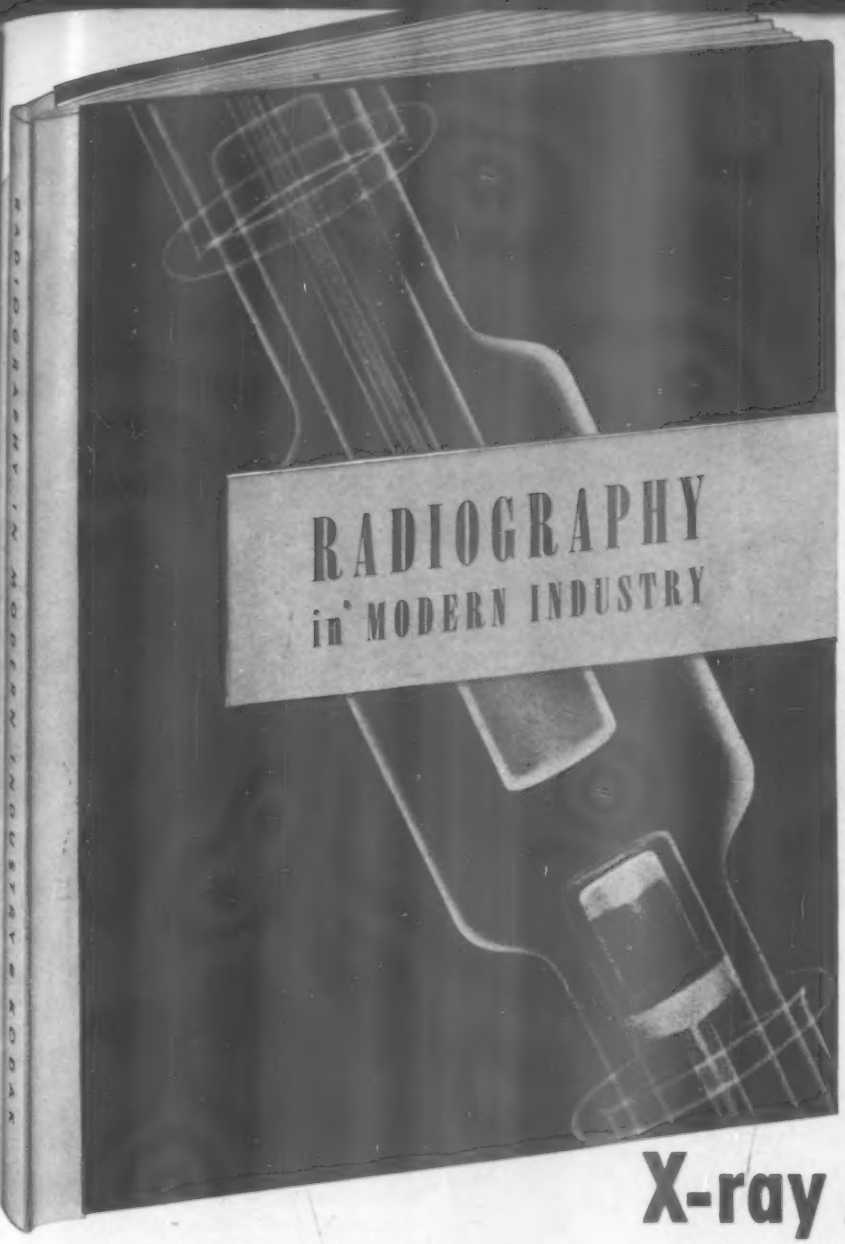


Fig. 3—Two-piece dipper construction. The body is made of a front and back, which are welded into one unit



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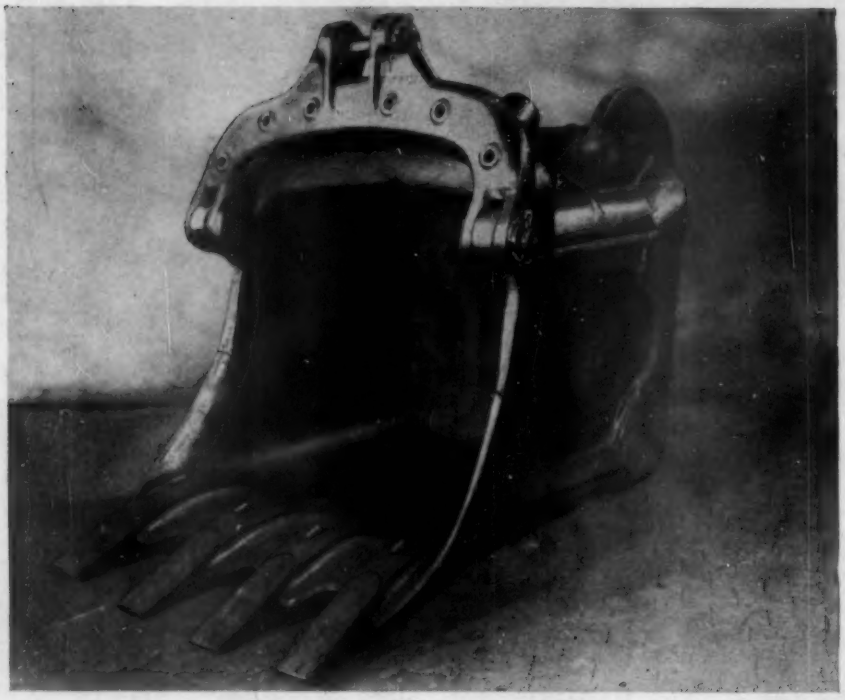

Fig. 4—Larger dippers are made in four pieces: front, back and two sides

Fig. 5—Digging rock on a highway construction project near Roanoke, Va.

electrodes of austenitic manganese steel. The dippers are manufactured in two types, according to capacity. For a range of from ¾ to 2 cu yd, the body is made in two pieces: front and back, welded as shown in Fig. 3. For capacities of 2 cu yd and upwards, the body is made in four pieces: front, back and two side plates (Fig. 4). Both of these illustrations show the several design features incorporated: the flared body, tapering out slightly to the door for positive and complete discharge of material; the lip correctly contoured for easy penetration and full loading; the clean-cutting teeth, rigidly locked in place yet easily replaceable.

What They Can Do

Asmco dippers of welded manganese steel have demonstrated their durability and loading efficiency in such applications as handling tough, abrasive slag for 96 hours a week, loading crude ore from an open-pit iron mine into trucks, handling destructive coral rock during military operations in the South Pacific. Fig. 5 shows one of them digging rock, including some "king-size" chunks, on a Lorain 70 power shovel being used for road building near Roanoke, Va.

No matter how tough the material may be, manganese steel is tougher, for it has the extremely useful property of work-hardening under impact that would fracture less tough metals. As the dippers continue in service, their teeth and inner surfaces gradually take on a "plowshare polish" that resists abrasion and assures smooth penetration and clean dumping.

Model Turbine Built by Welding

WELDING is helping considerably to build up the nation's hydroelectric power facilities and thus lessen our dependence on coal. The accompanying picture shows a model of a hydraulic turbine spiral casing that was fabricated from all-welded steel plate by the Allis-Chalmers Mfg. Co., Milwaukee. This casing surrounds and distributes water to the main turbine parts, which fit into the central circular space. Though built for testing purposes, it is similar in general design to larger hydraulic turbines of all-welded construction. Expected efficiencies of the big turbines can be predicted from tests conducted on this model.

Here a worker uses a portable grinder to dress the welds of a model hydraulic turbine casing

Book Review

THE WELDING ENCYCLOPEDIA, Twelfth Edition. Re-edited by T. B. Jefferson. Published by McGraw-Hill Publishing Co., New York, N.Y., 1947. Simulated leather, 6 x 9 inches, 1024 pages. Price $6.50.

For the twelfth time in 26 years THE WELDING ENCYCLOPEDIA has been revised. Since the first edition was published, welding has grown from a little used metal-joining method for those engaged primarily in maintenance work to a major fabrication means whereby metals are joined. Originally published in 1921, this encyclopedia of welding has gone through successive editions biannually until more than 175,000 copies have been distributed throughout the United States and all over the world.

It has been the aim of the editor to present a thorough, up-to-date treatment of every subject which deals in any way with welding, cutting or related processes. It was necessary to replace 300 pages of material of the previous edition to take care of the advances that have been made in welding during the war. In these changes the volume was expanded 48 pages.

The 1024 page volume, is in reality, five books in one. The first part, 800 pages, is a concise encyclopedia of welding. It is followed by an appendix of 32 pages which presents many interesting tables and charts, including those dealing with specifications, examples of good and bad welds, temperature conversion tables and an elaborate electrode comparison chart which lists various welding electrodes by tradenames and comparable AWS designations. Part 3 is a dictionary of tradenames. Here is listed all of the tradenames applying to the welding industry. The data covered includes the tradename, the products to which it applies and the manufacturer. This section is followed by a buyers' manual, which is the key to the sources of many items of useful equipment in the welding field. The encyclopedia closes with a 12-page index, which, together with the extensive cross reference, makes any welding subject easy to find.

The defining characteristic of this valuable reference encyclopedia is its practicability. The alterations and additions which have been made in the twelfth edition were, in many instances, suggested by the criticisms of previous readers. In considering these factors, information regarding metallurgy, metals, underwater welding, underwater cutting, weld inspection methods and data on the various welding processes has been greatly expanded. There is also included data on structural welding together with the latest welding codes, boiler welding and boiler welding codes, etc.

The twelfth edition, The Welding Encyclopedia, which should be the constant companion of the shop man and welding engineer, is an invaluable aid to the engineer or designer interested in welding and welding problems. The manner of material presentation makes it quite suited for text or reference use, either in the school or home.

these 3 men

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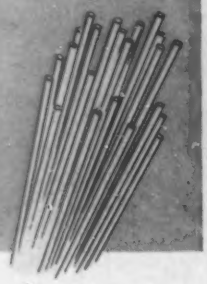

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About People

FRED MEYER, formerly a member of the sales engineering staff at Owens-Corning Fiberglas Corp., has been appointed chief engineer, railroad industry division of the Nelson Stud Welding Corp., Lorain, O.

★ ★

EUGENE LAVALLE, of Allied Weldery, Coeur d'Alene, Idaho, has been elected chairman of the Inland Empire section of the American Welding Society.

★ ★

RICHARD K. LEE has been named technical director of Alloy Rods Co., York, Pa. Mr. Lee is a graduate of Ohio State University. During the last six years he has been research engineer on arc welding electrodes, welding metallurgy and electrode production quality control.

★ ★

H. C. WALLACE has been appointed manager of Air Reduction Sales Company's Louisville, Ky. district. He will be responsible for the operations of all plants in this area, which covers the states of Kentucky, Tennessee and part of Indiana. Mr. Wallace's headquarters will be at the district sales office in Louisville.

★ ★

L. C. GRIMSHAW, formerly superintendent of the clad steel division of Latrobe Electric Steel Co., has been appointed metallurgical engineer of Jessop Steel Company's clad products division, Washington, Pa. Mr. Grimshaw will assist in the development, manufacture and application of Jessop's composite metals, including Jessop stainless-clad steel.

★ ★

W. J. CAMPBELL has been appointed arc welding specialist for General Electric's southeastern district, with headquarters in Atlanta. Mr. Campbell will cover the states of N. C., S. C., Tenn., Ga., Fla., Ala., Miss., and part of La.

★ ★

GEORGE R. WERNISCH, manager of the steel joist and roof deck division of Ceco Steel Products Corp., Chicago, has been elected president of the Steel Joist Institute. JAMES D. MAITLAND, of Colorado Builders Supply Co., Denver, has been named vice-president of the institute.

★ ★

HENRY H. KNAPP has been appointed a sales representative for the railway equipment division of the American Welding and Mfg. Co., Warren, O.

★ ★

KEMPTON DUNN has been elected secretary of the American Brake Shoe Co., N. Y. He succeeds SUMNER T. MCCALL, retired.

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	Soft Soldered		Silver Brazed	
	Start	Finish	Start	Finish
1	80°	87°	80°	88°
2	90	100	88	92
3	100	105	95	98
4	108	112	100	105
5	115	122	104	105
6	123	125	107	111
7	127	135	115	116
8	134	135	115	117
9	137	140	118	120
10	142	147	120	121
11	145	147	121	125
12	150	150	125	130
13	148	150	130	130
14	150	150	129	130
15	142	145	128	130
16	143	150	130	131
17	147	147	131	130
18	145	147	129	130
19	147	150	129	129
20	150	150	130	134
21	147	150	130	133
22	152	152	131	135
23	150	157	128	132
24	160	160	130	132
25	158	160	130	135
	Temperature Rise: **80°**		Temperature Rise: **55°**	

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50%

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IAA CONVENTION

(continued from page 42)

delivered the secretary's report. Among other matters, he touched upon the proposed standardized cutting torch for the U. S. Navy and said that a meeting had been held in Washington to work out the details. This standardization was requested by the joint Army-Navy Specification Board.

The report of the Oxy-acetylene Committee was presented by Secretary G. R. Webster because of the illness of Chairman A. N. Kugler. The committee's most recent revision, said Secretary Webster, is the comprehensive 1947 edition of the booklet, "Safe Practices for Installation and Operation of Oxy-acetylene Welding and Cutting Equipment."

The treasurer's report disclosed that the association now has a cash balance of $21,000 plus $16,000 in securities—a healthy condition.

After the nominating committee had delivered its report, the new officers were elected. R. B. Swope, president of Southern Oxygen Co., Inc., Bladensburg, Md., was elected IAA president to succeed Glenn O. Carter. John J. Lincoln, Jr., director of sales services, Air Reduction Sales Co., New York City, was elected vice-president. H. F. Reinhard and Philip Kearny were re-elected secretary and treasurer, respectively.

Three directors were also chosen. C. O. Epperson, National Cylinder Gas Co., Chicago, was elected to succeed himself. L. R. Cartier, Independent Engineering Co., O'Fallon, Ill., was elected to succeed P. E. Engler, The Balbach Co., Omaha. Glenn O. Carter, consulting engineer, The Linde Air Products Co., was named to succeed H. S. Smith, Union Carbide and Carbon Corp.

Only one change was made in the membership of the executive committee: the election of Mr. Swope to replace Mr. Kearny.

University Sessions

A drizzling rain greeted the opening of the second day, which, as luck would have it, was scheduled to be held at the Chemistry Building of the University of Cincinnati, about two and a half miles from convention headquarters at the Hotel Gibson. A very interesting program, however, rewarded those who braved the rain.

The morning session was opened by Professor R. S. Tour, head of the department of metallurgical engineering of the University of Cincinnati, who acted as general chairman. This university, Professor Tour revealed, was the first one in the nation to sponsor the co-operative system of education in which the theory of the classroom is alternated with the practice of an actual paid job.

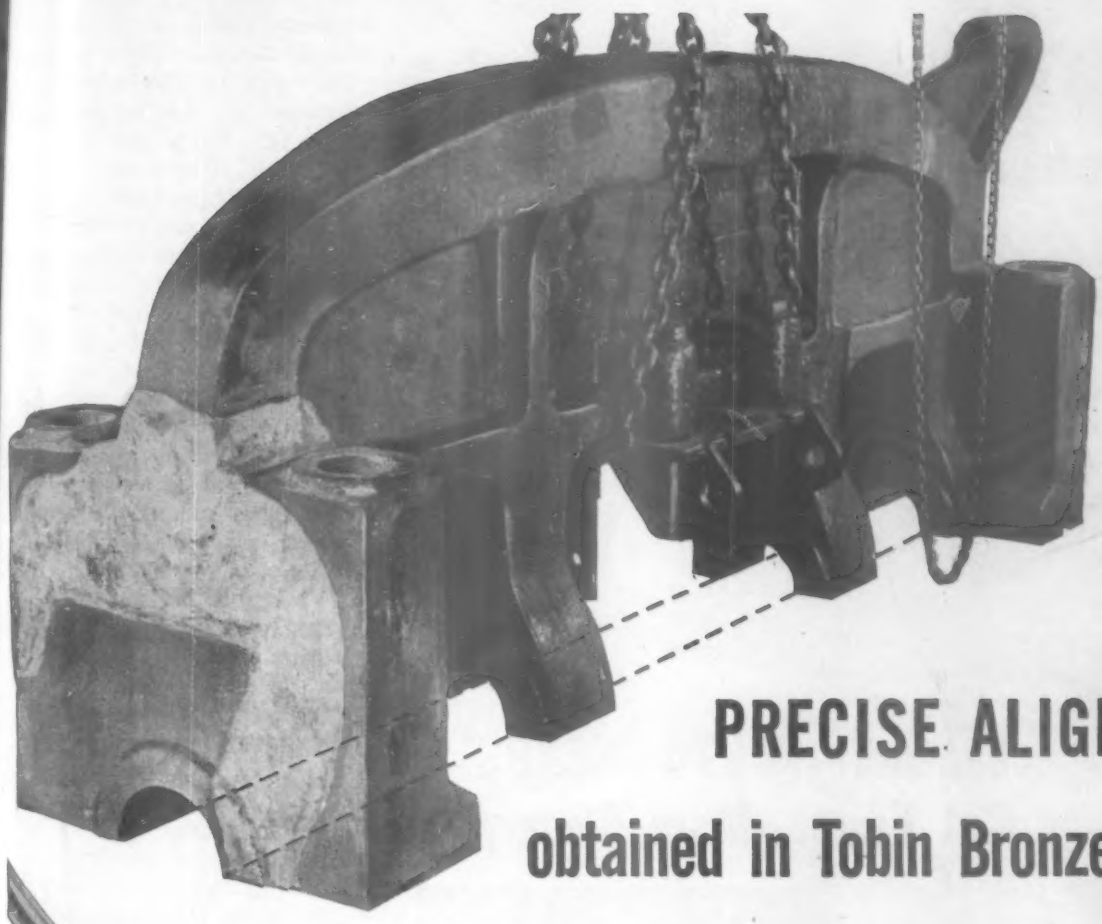
University President Walters gave a stirring address of welcome, in which he lauded the American system of living as the only one that upholds the dignity of the human spirit.

Harris A. Goodwin, The Bastian-Blessing Co., Chicago, substituted for Ellsworth L. Mills, of the same concern, as chairman of the morning session. J. J. Saelens, district manager, The Linde Air Products Co., Cincinnati, served as vice-chairman.

D. H. Fleming, Jr., development engineer, The Linde Air Products Co., Newark, N. J., read a paper dealing with oxy-acetylene powder cutting and scarfing. A. M. Setapen, manager, engineering division, Handy and Harman, New York City, discussed production methods of low-temperature silver-alloy brazing. Fundamentals of the oxy-acetylene welding and cutting process were explained by J. I. Banash, consulting engineer, Chicago, for the benefit of the undergraduates in the audience. The morning session was brought to a close by the technicolor movie, "No Keener Blade," introduced by R. A. Dunn, general sales manager of the Canadian Liquid Air Co., Ltd., Montreal.

After lunch in the adjacent Student Union building, IAA members and interested engineering students of the University of Cincinnati returned for the final session. This was expertly chairmanned by Henry Booth, vice-president, Shawinigan Products Corp., New York City, with the able assistance of G. L. K. Mueller, district manager, Air Reduction Sales Co., Cincinnati.

The initial afternoon paper, by Dr. F. K. Schoenfeld, vice-presi-



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obtained in Tobin Bronze Repair

REPAIR of this badly fractured double-throw press crown presented an interesting problem in accuracy, since the face of the broken end had to be in exact alignment with the opposite end so that both sets of key ways matched (within .005") with the keys of the supporting columns.

To accomplish this the Super Arc Welding Co. of Detroit tack-welded the broken parts first, cooled the work and carefully checked all measurements before final welding.

This oxy-acetylene repair needed only 36 man-hours of chipping time, 56 man-hours of welding and 400 pounds of Tobin* Bronze Rod.

Here again, low-temperature bronze welding meant that expensive and sorely needed equipment was speedily returned to duty, and at low cost. For detailed information on Anaconda Welding Rods, including Tobin Bronze and "997" (Low Fuming), write for Publication B-13.

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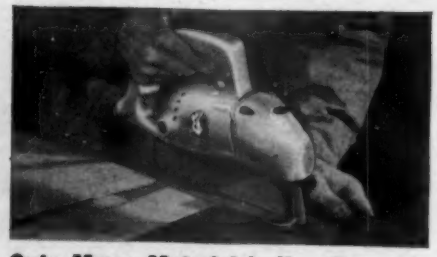

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PORTABLE ELECTRIC TOOLS

dent—technical, B. F. Goodrich Chemical Co., Cleveland, dealt with some of the new uses of acetylene as a chemical intermediate. In particular, Dr. Schoenfeld, discussed what he called the "Cinderella industry," the production of the vinyl resins. These materials, created by reacting acetylene with acetic acid, formaldehyde and other chemical substances, are now being used for such diverse products as insulation for electric cables; garden hose; fabrics for curtains, draperies and table cloths; dishes and shoe soles.

President Swope catalogued some of the achievements of the oxy-acetylene processes in the industrial field during the past six years and cited several specific examples to show how the oxy-acetylene flame is being used to speed the fabrication of new equipment and the repair of old.

Must Reach Future Engineers

The final paper, "Opportunities in the Welding Engineering Field," was delivered by Dean Charles E. MacQuigg, College of Engineering, Ohio State University. This university was the first in the country to establish a curriculum leading to a degree in Welding Engineering. "We believe," asserted Dean MacQuigg, "that he (the welding engineer) should be able to overcome the ignorance which so lamentably exists today on the part of design engineers who fail to specify the use of welding where properly indicated in so many kinds of structures. It is not enough that sales development be prosecuted through the regular channels of advertising, but some intimate contact must be established with those who are teaching our future engineers because they are the ones who will specify or exclude welding. Nor can we expect them to *think* welding unless they have been *taught* welding theory."

Dean MacQuigg also advocated an organized attempt to study systematically the whole field of structural design. "My belief," he stated, "is that today engineers are not practically or theoretically capitalizing, to anything like the fullest possibilities, the savings in weight which are potential through the use of welded designs."

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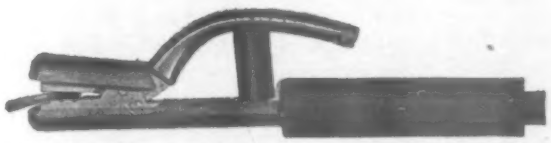

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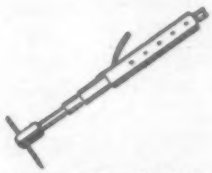

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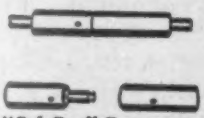

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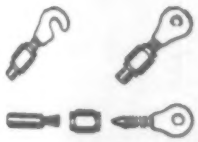

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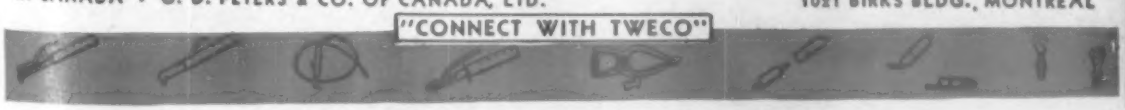

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Electroerosion—a New Tool for Metal Working

Soviet technicians have invented a process which they claim can be used for drilling, slotting, cutting, grinding or, by reverse action, electroplating. A spark discharge (not an arc) is produced, which simply erodes away the surface of the workpiece.

BY ROBERT MAGIDOFF
Moscow Bureau,
McGraw-Hill World News

★ RESEARCH

SOVIET scientists claim to have developed a new method of metal cutting called by them electric erosion (or "electroerosion") which makes use of a vibratory spark discharge instead of an arc. The discovery, which, according to Russian technical journals, may completely eliminate the need of cutting tools, is the climax of ten year's research on the part of Boris Lazarenko, and his wife Natalie of the Soviet Electric Institute.

EXPERIMENTAL INSTALLATION

In the first installation, a vertically suspended electromagnet, set up between two small supporting blocks, was caused to vibrate an armature. A clamp was placed underneath the armature; a small metal rod, acting as the cutting tool, was inserted in the clamp with its free end downward. The workpiece, a small plate, was fixed in an oil-filled basin. To operate, the small rod was brought down until it touched the plate. When the electromagnet was actuated, the rod began to "dance," slightly touching the plate and then recoiling from it.

Direct current was next supplied. A straight polarity set-up was used, the negative lead being connected to the rod, which functioned as the cathode, and the positive to the workpiece, which acted as the anode. A spark discharge made its appearance at the point of contact, causing the "erosion" to begin. The end of the rod gradually penetrated the workpiece, eroding, blasting and pulverizing the metal until it had penetrated entirely through the plate.

This primitive electric machine tool served as a basis for the development of improved designs of portable electroerosion tools and enabled the rate or efficiency of the process of erosion—the quantity of metal thrown out by the circuit discharge in a given unit of time—to be determined. It was discovered that a spark discharge proves much more efficient than an arc, is not accompanied by so high a temperature and does not burn nor oxidize the workpiece.

An important efficiency factor is the number of discharges per second. Neither a magnetic nor a mechanical contactor proved satisfactory to provide the vibrating motion necessary to produce the spark discharge. This was because a resonant vibration of the entire machine tool interfered with the precision of the operation.

Research revealed that the direct contact of electrode and workpiece is not essential for the appearance of the spark discharge, since, at a certain point when they are being brought together, the discharge itself penetrates the clearance between them, throwing out the metal eroded from the surface of the anode. This suggested that the electrode could be held immobile and the discharge produced by electrical means, as, for example, by increasing the voltage in the circuit.

A new contactless electroerosion machine tool had thus been invented. Its efficiency proved much higher than that of the pioneer model since the frequency of discharge depends only on the electric tuning of the circuit. It now amounts to hundreds of times per second and may be increased practically without limit. The electrode performs its function at a distance, never touching the workpiece.

With this tool, any metal or alloy, no matter how hard, may be slotted or drilled without the use of conventional cutting tools. "Slotting" electroerosion machines successfully perform all kinds of engraving work.

DISC ELECTRODE FOR CUTTING

A similar metal-cutting machine was designed, in which the electrode is a revolving disc about 1 mm (0.039 in.) thick. The workpiece is fed to the edge of the disc prior to the appearance of the discharge. A small water jet is supplied to the point of cutting from a special tube in order to wash

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out the pulverized metal as the disc penetrates the workpiece.

A similar method is used for grinding. A disc revolves over the surface of the workpiece, not touching it. Every discharge extracts a certain, always equal portion of metal from the workpiece, leaving a trace representing a circular hole of a certain diameter and depth. By modifying the discharge (which is expressed in the intensity of the current), it is possible to control to a fairly large extent both the depth and the diameter of the circular holes and also the nature of the surface produced; *i.e.*, from rough to smooth. The grinding of tools may be done in the same way by setting them under a certain angle to the cross-cut end of the disc.

Grinding in Reverse

Altering the polarity so that the grinding disc becomes an anode and the workpiece a cathode results in an interesting transformation of the grinding process. The metal is then extracted from the disc instead of from the surface of the workpiece. This suggests a new method of electroplating. If the liquid supply to the point of discharge is suspended and the anode disc is made to move uniformly over the surface of the workpiece, the pulverized material of the disc is attracted to this oppositely charged surface and will cover it in an even layer.

Two other types of apparatus for covering articles with metal coatings—a vibration and brush apparatus—were tested out in the inventors' laboratory, and each of them has particular advantage of its own under certain conditions. The electroerosion method, it is reported, can serve for the coating of conducting materials by all metals, including such metals as molybdenum, tungsten and tantalum, as well as by alloys and compounds. The bond between the coating and the foundation is said to have proved extraordinarily durable.

Electroerosion also solves the problem of tightly lapping together two working surfaces. If the ends of an oscillatory circuit are connected with two workpieces lapped to each other and an alternating current is supplied, the sparks of

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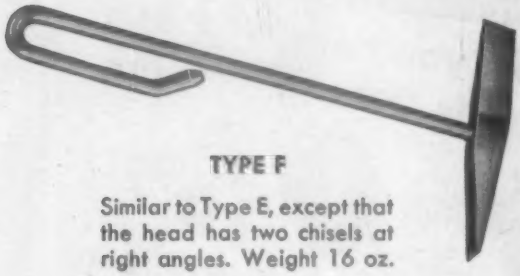
TYPE E

Head made of high-grade ¾ inch square tool steel, has combination drift and chisel for general chipping purposes. Special hand grip absorbs shock. Weight 16 oz.

TYPE CB

Triple Duty. Combines 3 tools in 1—drift, chisel, and removable wire brush.

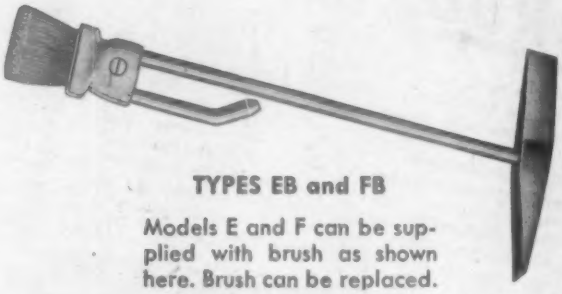


TYPE F

Similar to Type E, except that the head has two chisels at right angles. Weight 16 oz.

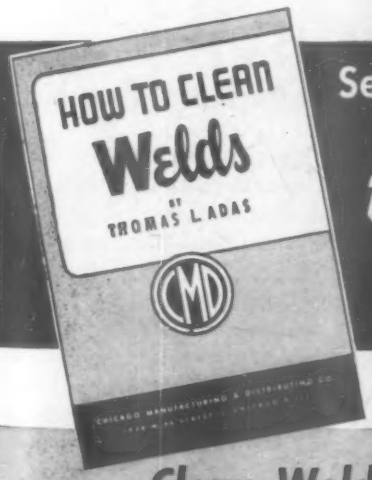
TYPE C

Drift and Chisel. Same as Type CB but without brush.



TYPES EB and FB

Models E and F can be supplied with brush as shown here. Brush can be replaced.



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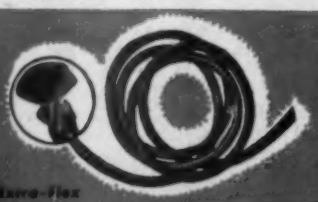
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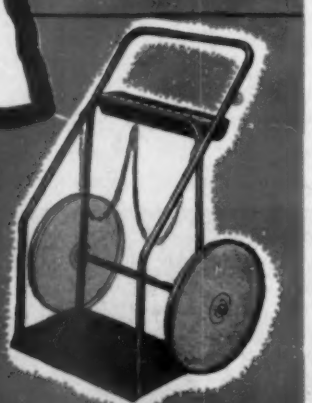

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the discharges will destroy the most protruding points of contact on both sides, converting them into very fine powder, which will be carried away from the zone of lapping. Thus the area of smooth contact will be progressively increasing, and the lapping surfaces will touch each other more and more closely. The similarity to flash welding is obvious.

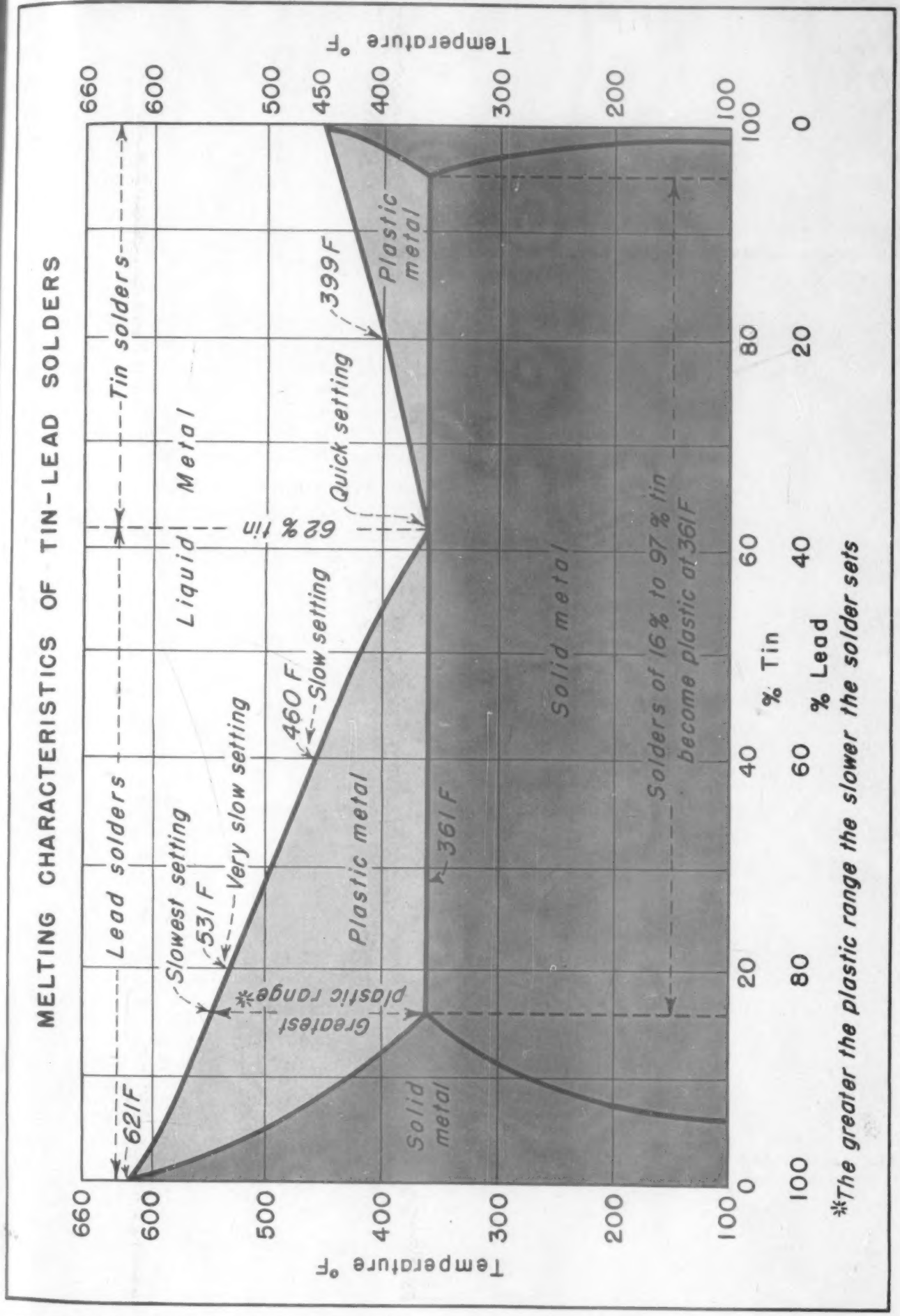
Copper-Carbon Electrodes

If and when the Lazarenko method permeates industry, Soviet technicians say, the present complex production of cutting, shaping, milling and grinding tools will be replaced by the simple production of electrode rods and discs. A new material has been found for this purpose, a copper-graphite compound from which electrodes of any form may be simply manufactured.

It is as yet difficult to estimate the saving of effort, means, metal and electric power that might be effected by the extensive introduction of this new Soviet technique. It is also difficult to say to what extent the method is being used in Soviet industry. Russian publications, to date, have not revealed this, and the information is not available on general inquiry. The electroerosion tools are admittedly still imperfect, but the fact that their inventors have received the coveted Stalin Prize clearly indicates that these tools have found their way into the practice of the Soviet metal-working industry, and probably on a considerable scale.

Safety Booklet

FIRST revision since 1942, the fourth edition of "Safe Practices for Installation and Operation of Oxy-acetylene Welding and Cutting Equipment" was recently announced by the IAA Oxy-acetylene Committee. This 64-page booklet embodies latest suggestions and recommendations as drawn from the publications of various technical societies and regulatory bodies. Copies are available at 25¢ each from the International Acetylene Association, 30 E. 42nd St., New York City 17.


MELTING CHARACTERISTICS OF TIN-LEAD SOLDERS
Temperature °F
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600
500
450
400
300
200
100
Tin solders
Lead solders
Liquid Metal
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621 F
399 F
Plastic metal
Quick setting
Slow setting
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361 F
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Solid metal
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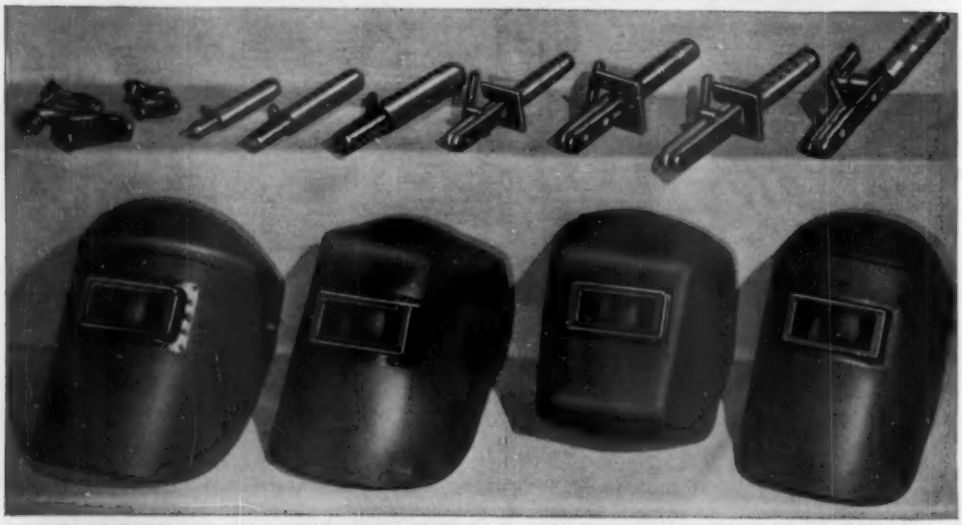
Need Electrodes? Allis-Chalmers mild steel, alloy steel, stainless steel, cast iron and hard surfacing electrodes are *production-proved* in A-C's own shops. They *have* to be good! And they're sold by *standard American Welding Society number.*

Need Accessories? Check the wide Allis-Chalmers line of *quality-built* equipment. You'll find helmets, electrode holders, cable, cable connectors, clamps, receptacles, gloves, garments . . . in a *variety* of sizes, types and styles.



For All Welding Requirements...

It will *pay* you to stop in at your nearby Allis-Chalmers welder dealer. You'll like his friendly, efficient service. And you'll find it *easy* to pick the *right* equipment from his large and varied line. Try *Allis-Chalmers* the next time you need arc welding electrodes or welding accessories. And when you need new *machines,* check the Allis-Chalmers line of Ampac a-c and Weld-O-Tron d-c welders. There's a size and type for practically any requirement. ALLIS-CHALMERS, MILWAUKEE 1, WISCONSIN.

A 2146

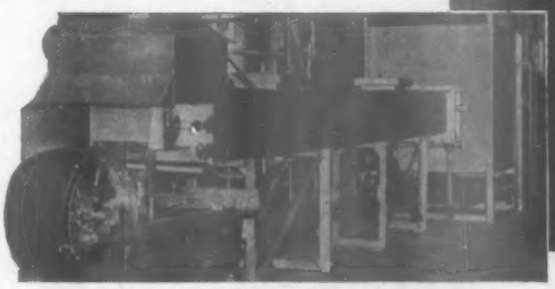
ALLIS-CHALMERS

One of the Big 3 in Electric Power Equipment — Biggest of All in Range of Industrial Products

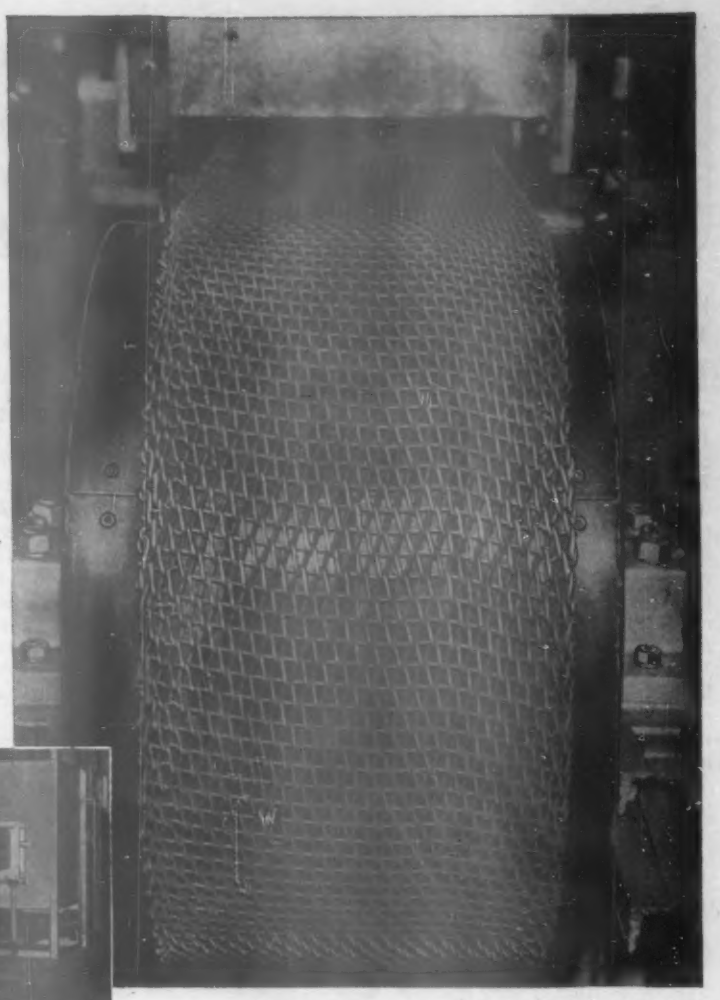
1847 1947
A CENTURY OF SERVICE to Industry THAT MADE America Great

"8,640 hrs. at temperatures from 1300 to 2040° F." ...and this belt's still going strong

...and that's only part of the story



Copper brazing furnace of Beech Aircraft Corp., Wichita, Kansas, equipped with Inconel belt obtained through Electric Furnace Co., Salem, Ohio.



Here's proof of Inconel durability. After 8640 hours in temperatures from 1300 to 2040°F., this Inconel conveyor belt was found to be in excellent condition. Not a single link had to be replaced.

● When Beech Aircraft Corporation called for an Inconel* brazing-furnace conveyor belt, they naturally expected long life. But, they got more. They got repair-free service. Their recent letter reads:

> *"The Inconel woven wire belt on our copper brazing furnace was placed in service September 6, 1945 — 24 hours per day — for draw and copper brazing.*
>
> *"It has been in continuous service since that date, except for down time of approximately 30 days during October 1946. At that time, repairs were made to the furnace,* but not to the belt.
>
> *"This belt now has been in operation for a total of 8,640 hours at temperature range of 1300 to 2040°, the stand-by temperature being 1300°.*
>
> *"We have made no replacements in the linkage to date."*

On scores of heat-treating jobs, Inconel is turning in performances like the above. For, this metal was especially developed for high temperature work. It's strong, ductile, and of great thermal endurance.

It does not scale away through oxidation. Resists most all corrosive atmospheres encountered in heat-treating operations.

You can get Inconel in standard mill forms. It's readily fabricated into designs to fit your individual requirements. Send today for copy of the bulletin, "For Long Life at High Temperatures."

*Reg. U.S. Pat. Off.

* * *

Get INCONEL Thermocouple Protection Tubes. They're seamless, strong, durable . . . for use up to 2200°F. in sulfur-free atmospheres. Available from your regular supplier.

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street — New York 5, N. Y.

INCONEL* . . . for long life at brazing temperatures

(80 NICKEL - 14 CHROMIUM)

News of the Industry

E.J. & E. Railway Installs More Welded Rails

PERFORMANCE of 20 miles of continuous rails welded in 1942 has proved so satisfactory that officials of the Elgin, Joliet and Eastern Railway are planning the installation of four new sections near Joliet, Ill. About a mile of rails will be laid between Joliet and Plainfield, some two miles between Joliet and Brisbane, this includes a crossing with the Wabash railroad, less than a mile from Brisbane to Frankfort and approximately two miles between Frankfort and Madison. All points are located in Illinois.

Failures have been negligible in the first section of welded rails, and only two of those that did occur were due to faulty welding. The company plans to eliminate this possibility entirely by the use of magnetic-particle inspection when the new sections are joined.

* *

A-C Welding Speeds Trailer Production

CONVERSION to a-c welding in the fabrication of large "haul-away" auto trailers at the trailer division of the Whitehead and Kales Co., Detroit, is said to have resulted in increased production, a 30% reduction in operating cost and a 50% saving in plant floor space. The new equipment makes possible a continuous production line for welding of the various subassemblies.

The only parts of the trailers not welded are the side sheets, which are riveted into place. As a safety precaution, the company has installed voltage controls which disconnect welders from the line where they are idling, removing all but the control-circuit voltage from the welding leads.

* *

Welded Floors for Freight Cars

GREAT LAKES STEEL CORP., has introduced a nailable steel flooring for railway freight cars, trucks and trailers. This flooring consists of an 8-in.-wide channel with grooves between them in which ordinary nails can be driven. The channels are formed from high-tensile, low-alloy steel; they are laid across the width of the car or truck and welded to the underframes. Spaces are left between the channels to provide the nailing grooves, which are filled with a self-sealing composition to prevent the loss of bulk freight such as sand and grain. This new type of flooring is expected to last the lifetime of the car and to remain in condition for freight for from 20 to 25 years.

Westinghouse Offers R-F Heating Course

WESTINGHOUSE ELECTRIC CORP., is offering an eight-lecture sound-slide course on the fundamentals of radio-frequency heating. This series of 2-hour lecture units outlines rule-of-thumb methods for determining how and when R-F heating can be economically applied. The applications covered include soldering, brazing, annealing and hardening by induction heating and also bonding of non-metallic materials by dielectric heating. The complete kit contains 15 slide films, records to match, 20 sets of review booklets and quiz questions for class members and an instructor's manual. Cost is $185.00.

* *

Eutectic Inaugurates Distributor Policy

TO MEET an increased demand for its low-temperature products, Eutectic Welding Alloys Corp., New York City, has begun a policy of local distribution. Territories are open for established supply dealers, each of whom will receive the assistance of local field engineers in merchandising the line and in handling consumer problems. Further information may be obtained from A. E. Zeisel, vice-president in charge of sales, Eutectic Welding Alloys Corp., 40 Worth St., New York City 13.

* *

Stud Welding Streamlines Automobile Bumpers

THREE out of every ten cars coming off the 1947 automobile production lines are minus the bolt heads that have hitherto marred the stream-lined surfaces of bumpers. The reason is that auto manufacturers are using stud welding to attach headless bolts welded directly to the interior surface of the bumpers.

Discuss Welded Drier Rolls at Paper Makers Convention

HOW increased production is possible with the double-shell drier roll of welded steel construction, developed during 12 years experience at Lukenweld, Inc., was demonstrated in a paper by George L. Snyder, assistant manager development engineering, Lukens Steel Co., Coatesville, Pa., presented before the board group meeting of the 27th annual convention of the Pulp and Paper Mill Superintendents' Association, held May 23 at the Edgewater Beach Hotel, Chicago.

An article on welded steel drier rolls by William H. Funk, development engineer, Lukens Steel Co., and subsidiaries, appeared in the Feb., 1947, issue of THE WELDING ENGINEER.

* *

Country's "Safest" Welding Shop

STUDENTS of the Tacoma, Wash., vocational school need have no fear of fumes, dust or germs when they are taking instruction in the school's new welding shop. All of the stations are equipped with individual exhaust systems, each having a capacity of 500 cu ft of air per minute, to draw off smoke and fumes. Furthermore, a germicidal lamp is used to sterilize welding helmets and goggles before they are worn by students.

Said to be one of the safest, best engineered and completely equipped in the country, the 39 by 59 ft shop has 12 arc and 12 gas welding stations, a cutting table, layout slab, a large booth for group demonstrations and ample space for classroom lectures.

* *

Progressive Welder Opens Sales Offices

DUE to an expanding use of resistance-welding processes in Detroit, Progressive Welder Co., has opened a local sales and engineering office at 578 Maccabees Building, which will function as the Progressive Welder Sales Co. It will be headed by Harry S. Rose, sales manager for the parent company for the past eight years. Associated with Mr. Rose are Douglas K. Renney and Douglas I. Harris, both connected with sales and service. Thomas J. Crawford also joins Mr. Rose as welding consultant.

New plant of Atlas Welding Accessories Co., located at 707 E. Lewistown Ave., Ferndale, Mich.

YOUR *Best* BUY *in welding equipment*

Mid-States OFFERS MORE FOR YOUR WELDER DOLLAR

More EXCLUSIVE FEATURES
More JOB VERSATILITY
More EASE OF OPERATION
More DEPENDABLE SERVICE
More BUILT-IN QUALITY
More VALUE THROUGHOUT

MID-STATES FAMOUS METAL ZIPPER

World's Foremost Hi-Cycle Arc Welder

A deluxe outfit that meets every welding requirement. Packed with outstanding features. Unsurpassed in versatility, performance and efficiency. Exclusive high frequency design enables you to do welding, brazing, soldering, hard-surfacing, heating and other operations with amazing ease. Handles all metals, from thin 30-gauge sheets to heavy plate. Very simple to operate. Has automatic arc, constant current flow, positive arc control, selective heat stages. Finest quality construction. Available in a choice of six different models for every welding range.

Model 300-U Illustrated

FARM WELDER

Built to R.E.A. Specifications

The Metal Zipper Model 200-A is specially suited for all-around farm use. Because it has a lighter line draw, it is ideal for use in areas where restrictions do not permit the use of heavier amperage equipment. Same rugged construction as other Metal Zippers, except that top capacity is 150 amperes. For all light, medium and medium-heavy welding. Also hard-surfacing, soldering, heating, etc. Simple, dependable operation. Built to R.E.A. specifications. Available with or without accessories.

ZIPPER-ET PORTABLE WELDER

A Complete Outfit All in One Carrying Case

A low-cost, compact electric welding outfit, designed for easy portability and general light-duty welding. Accessories fit into detachable tray on bottom of case. Lightweight, easy to carry. Ideal for home work-shops, garages, etc. Does high-grade welding, brazing, hard-surfacing, soldering. Simple, economical operation. Complete as illustrated. For 110- or 220-volt AC.

Carry It Anywhere

The "MISSING LINK"

Hi-Cycle Automatic Arc Unit

Provides the missing link necessary to achieve peak performance in AC welding. Starts arc automatically . . . and keeps it going! Eliminates pecking and scratching. Provides greater welding ease, particularly on light gauges. Easily attached to improve the performance of any welder, AC or DC.

9000 ARC TORCH

Simplifies Tough Welding Operations

Does brazing, welding, hard-surfacing, soldering, with greater ease. Particularly valuable for light-gauge work. Produces sound dense welds, free from blow-holes. Available separately, for any AC or DC welder.

VIBRA-WELD

Welds "Cold"! Salvages Castings!

Welds without incurring heat distortion or residual stress in the base metal. For repairing cracked blocks, heads, etc. Ideal for reclaiming castings that have surface defects.

See your dealer, or write for details . . .

Mid-States EQUIPMENT CORPORATION

2429 South Michigan Avenue • Chicago 16, Illinois

Tailor-made for the job

the RIGHT ROD for Every Job

Tailoring Rods to meet the needs of industry . . . Marquette Metallurgists are creating new, outstanding Electrodes . . . each one a leader in the field. There is a Marquette Electrode for every welding job that will give you a stronger finished product at lower cost.

NICOL-ROD for Non-Ferrous, Machineable Welds on Cast and Malleable Iron . . . the Original and Best Nickel Rod. This Nickel alloy electrode has a special coating which gives excellent welding characteristics. Makes perfect bond to parent metal with soft, close grained and thoroughly Machineable welds (without preheating). Marquette A.C.-D.C. NICOL-ROD 44 is low in cost but worth its weight in gold! . . . for years it has been used to salvage expensive foundry castings and on a multitude of maintenance jobs.

BRONZE-ROD 61 for Brazing Cast and Malleable Iron, Welding Copper and Bronze . . . a New development in electric welding pioneered by Marquette Metallurgists. It makes possible brazing of steel, cast iron and malleable castings, galvanized iron, bronze and other copper alloys by arc welding. This versatile Marquette A.C.-D.C. Electrode has good ductility and high tensile strength.

TOOL-ROD 650 . . . the scientifically balanced alloy of Tungsten, Chromium, Molybdenum, Vanadium Tool Steel which produces a weld with extra tough cutting hardness. Unexcelled for renewing shear edges, lathe tools, drills, punches, dies, stone drills, auger bits, etc. Build new tools and dies with low carbon steel and hardsurface the working edges with Marquette A.C.-D.C. TOOL-ROD 650.

BUY THE ROD-PAK or BUY THE CARLOAD

MARQUETTE WELD-ALL KIT

Your Maintenance department can take full advantage of Marquette's "Know How" which produced these outstanding electrodes by ordering the handy new 5 and 10 pound Marquette ROD-PAK, which comes in 17 TYPES and All Sizes of electrodes. Marquette Weld-All Kit gives you a generous supply of 12 types of various sizes of rod in one handy package.

Order Marquette Electrodes in standard containers for your production line. Special Discounts on single orders over 250 pounds.

THE NEW MARQUETTE ROD-PAK . . . in Handy 5 and 10 pound packages.

Sold Exclusively thru the Nation's Leading Distributors

MARQUETTE
REGISTERED U.S. PAT. OFFICE
Welding
EQUIPMENT
A.C. ARC WELDERS · ELECTRODES
GAS WELDING And CUTTING EQUIPMENT
ACETYLENE GENERATORS · ACCESSORIES

MARQUETTE MFG. CO. INC.
MINNEAPOLIS 14, MINN.

Welding Distributors Meet in Philadelphia

SOME 117 welding distributors and equipment manufacturers came from all parts of the country to attend the third annual convention of the National Welding Supply Association, held May 5 and 6 at the Benjamin Franklin Hotel, Philadelphia. The meeting was a huge success.

At the opening session, President O. L. Schneiderwind, Omaha Welding Supply Co., in giving his annual report, advised that the NWSA had selected Robert C. Fernley as permanent secretary and treasurer, to be assisted in this position by George A. Fernley and Thomas A. Fernley, Jr., as advisory secretaries. These gentlemen are members of a professional secretarial group established in 1886.

Speakers on the Monday morning program were H. R. Rinehart, secretary of the National Supply and Machinery Distributors Association, who spoke on what an active trade association can accomplish, T. B. Jefferson, editor of THE WELDING ENGINEER, who presented a talk on "The Progressive Distributor." At the afternoon meeting D. W. Northrup, president, Henry G. Thompson and Son Co., New Haven, Conn., spoke on the importance of a definite sales policy. Henry Miller, director, Trade Practice Conferences, Federal Trade Commission, Washington, D. C., talked on the advantages of trade practice rules.

Tuesday morning was given over to a report by the executive committee and the introduction of officers for the coming year. New officers elected were: president; R. E. Chase, Chase Welding Supply Co., Benton, Ill.; senior vice-president; R. S. Mars, W.P. & R.S. Mars Co., Duluth, Minn.; vice-presidents: W. T. Heters, Welders Supply Co., Portland, Ore.; J. N. Alcock, Saginaw Welding Co., Saginaw, Mich.; Howard Proctor, Acme Welding Supply Co., Houston, Tex.; V. S. Rice, Virginia Welding Co., Charleston, W. Va.; J. W. Albiston, Maine Oxy-acetylene Supply Co., Auburn, Maine.

Next on the agenda was a program presented by Secretary Thomas A. Fernley, Jr., who sketched prospective activities in which the association might engage. After discussion of these activities, St. Louis was selected as the site for the association's 1948 convention.

Social activities of the convention were confined to a reception and annual dinner, held Monday evening. President Schneiderwind acted as toastmaster, and the guests were entertained by an informal after-dinner talk by Editor Jefferson.

On the afternoon of the second day, convention delegates were guests of R. D. Thomas, president, Arcos Corp. A trip through the Arcos plant afforded an opportunity to see how high-alloy electrodes are manufactured.

During the meeting, 21 new members joined the association. Ten of these are associate members (a membership classification confined to manufacturers); the remainder active members in the distributor group.

8 MAJOR DEVELOPMENTS .... *by* HARRIS

1 **FIRST** Gas Cutting in U. S. A. * in 1899 by John Harris.

2 **FIRST** exhibit of Torches, Acetylene Convention, St. Louis World's Fair in 1904.

3 **FIRST** Propane Cutting Torches in the World introduced in 1916.

4 **FIRST** "Gasavers" in U. S. A. This device has saved users thousands of dollars through gas economy.

5 **FIRST** "Automatic" Torch in the World. This Torch offers remarkable reductions in gas consumption.

6 **FIRST** Carbide-to-water Portable Automatic Low Pressure Acetylene Generator in U. S. A., making possible substantial savings in Acetylene Gas costs.

7 **FIRST** "Multi-Stage" High Pressure Regulator in the World, producing exceptionally close pressure regulation.

8 **FIRST** Non-Flash, Low Pressure Welding and Cutting Torches in U. S. A. to operate under severe conditions without backfiring.

* Early Foreign Patents on Cutting Torches and the Cutting Process afforded years of virtual monopoly. It was the prior use by Harris that was largely responsible for the invalidation of those patents in the U.S.A. thus greatly benefiting American industry.

The Harris Calorific Company offers a complete line of equipment for the Welding and Cutting Industry. Its Leadership in the field has gained for its products world-wide distribution and acceptance.

The HARRIS CALORIFIC *Co., Cleveland, O.*

NOW!

A NEW A-C WELDER
THAT WILL GIVE YOU
EXCELLENT RESULTS

INSTANT STARTING ARC
SMOOTH, SOFT ARC
CONTINUOUS STABLE ARC

The new KERN principle of design, utilizing an ingenious magnetic circuit, eliminates the necessity for reactor coils and arc boosters and permits an easier-starting, smoother, more stable arc than has ever been possible before—and from a smaller, more portable welder.

Using 4 coils (2 primary, 2 secondary) instead of the usual 2—more copper—assures HIGHER EFFICIENCY—LONGER LIFE—MORE ARC STABILITY. Moving the core and not the coils assures HIGHER EFFICIENCY—GREATER OPERATOR SAFETY—FASTER, EASIER CHANGE OF AMPERAGE.

5 models . . . 130, 180, 200, 300, 400 amps.

We invite you to put a KERN Welder to your test—write today for information.

DISTRIBUTORS, If you are interested in handling what we believe to be the most versatile line of welders available today, write!

JOHN A. KERN CO. 224 N. LOOMIS ST. CHICAGO 7, ILLINOIS

National Cylinder Gas Buys S.A. Properties

NATIONAL CYLINDER GAS CO., Chicago, recently extended its production and distribution facilities to South America with the acquisition of Gases Industriales de Venezuela C. A. and the purchase of an interest in Gases Industriales de Colombia C.A. Both concerns are manufacturers of oxygen and acetylene.

The new Venezuelan property, which is the country's largest producer of welding gases and distributor of equipment and supplies, includes five plants located at Maracaibe, El Tigre, Santa Barbara, Maracay and Paraguana. The Colombian company has an acetylene plant at Barranquilla and a plant under construction at Medillin for the production of both oxygen and acetylene.

*

Wright Forms Non-Profit Research Organization

IT is not often that individuals enter business for the welfare of society. However, such is the case with Reverend Joseph S. Wright, a contributor to THE WELDING ENGINEER, who has formed the Colonial Research Co., Jersey City, N.J., a non-profit organization for the advancement of the welfare of the people through scientific research.

Mr. Wright is also currently involved with a national safety campaign sponsored by Shuman's Auto Hospital, Yonkers, N.Y. One phase of this campaign is the promotion of truck grill guards to protect the life of delivery drivers. The latter is illustrated in the photograph reproduced on this page; it consists of 1¼ by ¼ in. steel bar stock bent at right angles and arc welded to form the letters of the word "Cleanart."

Among the welding processes developed by Colonial Research is the welding of white metal, as described by Rev. Wright in an article, "A New Way to Weld White Metal," in the July, 1946, issue of THE WELDING ENGINEER. None of the research company's methods will be patented.

All-welded grill guard. Letters were formed by bending and welding bar stock

STAINLESS STEEL

cut ⅓ cheaper... and 6 times faster

That is the enthusiastic report on Airco's new Flux-Injection Method of cutting stainless steel at American Fabricators, Inc., of Louisville, Kentucky.

They continued: "We are well satisfied with this Airco process. Cutting #347 stainless, ⅝" thick, we operate at least ⅓ cheaper and 6 times faster than if it were cut mechanically . . . and the operation, at all times, has been very satisfactory."

So say satisfied users from every part of the country. They know the important savings that can be obtained by this new stainless steel cutting technique over the slow, laborious "melting-away" and mechanical processes.

Designed for use with standard Airco oxyacetylene equipment, this new Airco stainless steel cutting method keynotes simplicity, safety and production economy. It brings operating conditions for stainless steel cutting to mild steel ranges, with comparable speeds.

An explanatory article — "Flux-Injection Method Brings Economies of Oxyacetylene Flame Cutting to Stainless Steels" — is available. For your free copy, write: Dept. WE-6142, Air Reduction, 60 East 42nd St., New York 17, N. Y. In Texas: Magnolia Airco Gas Products Co., Houston 1, Texas. Represented internationally by Airco Export Corporation.

AIRCO **AIR REDUCTION**

Offices in All Principal Cities

Headquarters for Oxygen, Acetylene, and other Gases • Carbide • Gas Welding and Cutting Apparatus and Supplies • Arc Welders, Electrodes and Accessories

A Complete Line of Cylinders for ALL GASES

INDEPENDENT cylinders take from 5 to 10% more gas. Uniformity of monolithic filler insures even distribution of acetone. Acetylene cylinders available in 10, 40, 100, 150, 250 and 285 cu. ft. sizes. Oxygen cylinders in all sizes. Also storage cylinders, in 12 and 20' lengths of 850 and 1500 cu. ft. capacities.

Write for quotations on *any* size for *all* gases.

Low Pressure ACETYLENE GAS PRODUCING PLANTS

This 600 pound Acetylene Generator Plant (generator only shown) is one of the safest manufactured. Its automatic controls minimize operating personnel. Affiliate units are designed to insure maximum production at minimum cost. Capacity 2700 cu. ft. per hour. Details of construction and layout gladly furnished.

We invite your inquiries on oxygen producing plants of all sizes.

INDEPENDENT ENGINEERING COMPANY, Inc.

Manufacturers of

CONSULTING · RESEARCH · DESIGNING

CYLINDERS AND GAS PRODUCING EQUIPMENT
ACETYLENE · OXYGEN · HYDROGEN · NITROGEN

O'FALLON, ILLINOIS

DOCKSON #145 KIT

A COMPLETE WELDING AND CUTTING OUTFIT

This 145 easily handles any light or medium welding or cutting operation up to 3-inch steel plate.

• Finest design and construction • Scientifically balanced, sturdy equipment for effortless operation • Economically priced. Today's best buy in a quality outfit.

FACE SHIELDS • GOGGLES • HELMETS FOR EVERY NEED

Write for your copy of our Welding or Safety Equipment catalog.

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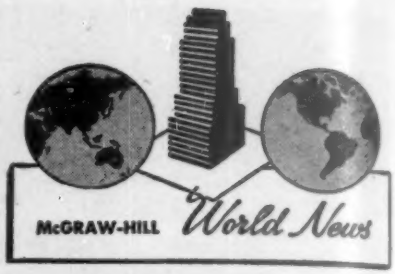


Russians Develop Electromagnetic Micrometer

SOVIET physicists N. S. Akulov and N. I. Yermin have designed an electromagnetic micrometer for measuring the thickness of protecting layers or plates. The basic part is an iron rod on which are wound three coils. The central coil serves as a magnetizer of the rod. The two other coils are connected in series, and their free ends are extended to a galvanometer.

Using a high-frequency generator adjusted at 30,000 cycles per second, an alternating current of high frequency is passed through the central coil. The variable magnetic field thus created magnetizes the rod and inducts electromotive forces into the two other coils. Brought near a metal surface, the rod's magnetic field creates in the metal so-called "parasite" currents, which also are alternating and have the same frequency as the generator. The parasite currents create their own magnetic field, which acts more strongly on the nearer coil than on the more distant ones, thus disturbing the equilibrium of the electromotive forces in the coils. Current in the coils causes the needle of the galvanometer to move from zero. The distances between the ends of the electromagnet and the metal surface will correspond to the various notations of the galvanometer.

When the generator is adjusted at 30,000 cycles per second, the parasite currents concentrate themselves only in the vicinity of the surface. The device may also be used as a "defectoscope"; any defect within the metal, such as fractures, abscesses, etc. will distort the parasite currents, which in turn will effect the notations of the galvanometer.

* *

New Arc-Welding Method for Russian Construction

A Russian method of high-frequency manual arc welding is said to increase efficiency threefold, reduce the expenditure of electrodes by half and provide considerable saving of electric power. Developed by experts of the Soviet Steel Structure Designing Trust, the electrode (a fine metal rod covered with a lubricant) is made to rest closely on the parent metal instead of remaining suspended. The method thus resembles contact arc welding.* The electrode fuses and mixes with fused metal of the elements joined, forming a welded seam after cooling. Because of the close relation of the lubricant to the base plate,

* See page 54, THE WELDING ENGINEER, January, 1947.

the crater in which the arc is burning is located deep in welded material. This deep penetration enables the visible part of the seam to be reduced by half, leaving the scheduled size unchanged.

The new process is being introduced on a wide scale at the new plants being constructed for heavy industry by the Soviets.

* *

Conduct Tests for Welded Structural Joints

DETERMINATION of the toughness of welded joints in steel structures by measuring the load-carrying ability of specimen welds is discussed in a research report prepared by Capt. S. A. Herres for the Watertown Arsenal Laboratory, Watertown, Mass.

Captain Herres, who is now with Battelle Memorial Institute, proposes that tests of specimens including welded joints should be compared with test results on similar specimens of unwelded metal. The tension side of the welded specimen should represent the irregular surface of the weld. In this way, the toughness or ability of the welded member to adjust its shape to withstand the load can be evaluated.

A manifestation of toughness is the property of plastic flow that smooths over a rough place where stress is concentrated. Instead of cracking at the notch or rough place, a piece of tough steel flows enough to adjust its section to reduce the stress concentration and to line up any weak places in the direction of the force.

The report summarizes a series of bend tests on steel specimens heat-treated to approximately equal strengths but to different levels of toughness and with various kinds of notching. The results show that deep notching and low testing temperature greatly decreased the load-carrying ability of the more brittle specimens.

Captain Herres' report (PB-49082) "Mechanics of Welded Structure," "Effects of Stress Concentrations and Residual Stresses on Mechanical Properties of Welded Joints" may be ordered from the Office of Technical Services, Dept. of Commerce, Wash. 25, D.C.

* *

Ampco Appoints New Licensee

AMPCO METAL, INC., Milwaukee, Wis. has appointed the J. B. Ripley Brass Foundry, Windsor, Vermont, as its licensee. The agreement authorizes Ripley to produce and sell aluminum-bronze castings and other Ampco products in Vermont and New Hampshire.

* *

Linde to Augment California Facilities

LINDE AIR PRODUCTS CO., has started construction on a new oxygen-filling station and acetylene-producing plant at Stockton, Calif. These facilities are expected to be completed late this summer.

Save Money on Your Tough Weld-brazing Repair and Salvage Jobs

. . . . use Ampco-Trode "AC" coated Aluminum Bronze Electrodes with your economical "AC" welder — for maximum efficiency and lowest cost

The new, improved Ampco-Trode "AC" electrode is ideally suited for "AC" bronze welding. It doesn't snuff out, and it is easy-striking. This results in faster production and saves time and money.

This versatile aluminum bronze electrode saves money in other ways too: It welds dissimilar metals, such as cast iron, malleable iron, bronze, and some nickel alloys. It permits the use of economical transformer-type AC welders on the toughest kind of jobs. It can also be used with reverse polarity for direct-current welding, when so desired.

Moreover, Ampco-Trode "AC" is easy to manipulate in all positions. The arc is soft and stable, the beads feather-edge perfectly into the base metal, and the deposit is dense and pit-free. This deposit has important additional advantages such as excellent physical properties and wear- and corrosion-resisting characteristics.

See your nearest Ampco distributor for all the facts. Order a supply of Ampco-Trode "AC" electrodes from him, and save money on your tough weld-brazing jobs. Write us for latest literature.

AMPCO

Ampco-Trode is a product of

Ampco Metal, Inc.

Department WE-7 • Milwaukee 4, Wis.

W-100

BULLETIN

low-temperature welding and brazing alloys and fluxes

All-State

ALL-STATE WELDING ALLOYS CO., INC.
96 WEST POST ROAD • WHITE PLAINS, N. Y.

TO EVERYONE WHO BUYS
WELDING SUPPLIES

When you buy All-State low-temperature welding alloys and fluxes through your local distributor, you get them at the lowest prices available consistent with quality. On many such purchases you save as much as 40 per cent. The economy stems primarily from the method of distribution. That's why All-State maintains a policy of selling only through local distributors. Through your distributor is the quick, easy, economical way to order welding supplies. And here are other ways that you benefit from this policy:

1. Your All-State distributor has been selected to sell directly to you because he is especially well qualified to understand your welding needs.
2. He keeps on hand a complete stock of All-State rods, electrodes, fluxes, and galvanizing powder.
3. He is trained to help you with your special welding problems and will take a direct personal interest in your welding needs.
4. He is prepared to conduct welding clinics and training courses where you can come and brush up on low-temperature welding techniques and where the men from your plant can come for additional training.

Write to the above address for the name of your local distributor of the All-State line and for a copy of our pocket-sized catalog B-7.

FOR PRODUCTION CONSTRUCTION MAINTENANCE AND REPAIR

PROFITABLE WELDING
WITH *Easy to Operate*
TRINDL SUPER INDUSTRIAL
ARC WELDERS

A Range of Models for Every Welding Job!

"Job tested" TRINDL WELDERS, outstanding in the welding field because of the Simplified Operation and Ruggedness of Design and Construction, are unbeatable for practical efficient low cost operation. TRINDL WELDERS, preferred for general industrial and automotive production, construction, maintenance and repair, are available in a range of models for every type of shop or welding job.

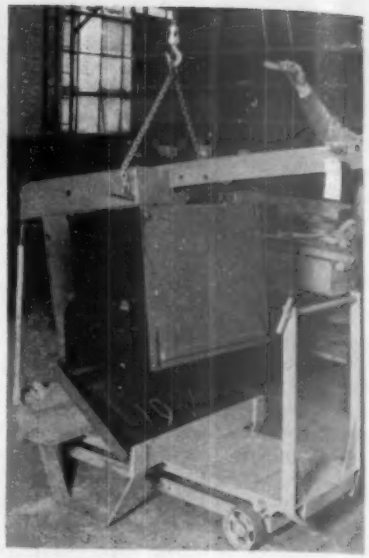
Trindl

DEPENDABLE TRINDL WELDERS, WELDING SUPPLIES & ACCESSORIES ARE AVAILABLE TO SAVE YOU BOTH ... TIME AND MONEY

Write, wire or phone today for particulars and catalogs

JOBBER AND DISTRIBUTOR INQUIRIES INVITED
Write for Selected Distributor Plan.

TRINDL PRODUCTS LTD., 17 E. 23rd St., AR, Chicago 16, Ill.



Yale & Town's "Special Zephyr" truck for handling cumbersome weldments

Hand Truck Handles Awkward Weldments

BY combining a skid and a hand truck, Yale & Towne, Philadelphia, solved its problem of handling big welded frames during assembly. The basic truck—Yale's "Special Zephyr"—is a model with a full deck and rail handle. Heavy steel skid legs were welded to structural angles secured abeam of the hand truck deck, and an end rack was added by welding vertical steel flats to the corners of the open end of the deck.

When the deck (raised by a foot lever) is down, the skid legs rest on the floor and act as a brake. By positioning the angles to fit the contours of the odd-shaped load, and by installing a removable bar at a height convenient to support the overhang of the load, all danger of the work sliding or falling as the truck is being moved is eliminated.

* *

American Optical Wins Honors in Safety Contests

IN a state-wide accident prevention contest, the American Optical Co., Southbridge, Mass, was judged to be the safest industrial concern in Massachusetts in which to work. In a commercial vehicle accident reduction contest, another award was won by American Optical for operating its trucks in 1946 without accidents. Both of these contests were sponsored by the Massachusetts Safety Council in coöperation with the Associated Industries of Massachusetts.

* *

Welding Replaces Rivets in C & O Hopper Cars

WELDING is playing the leading role in the production of the last group of hopper cars ordered by the Chesapeake & Ohio Railway. The 3,000 cars scheduled for construction will be built by American Car & Foundry Co., in its new plant at Huntington, W. Va., All cars will be of a new design developed by A. C. F. engineers.

Carnegie-Illinois Plays Host to 56,500 Guests

GATES of Carnegie-Illinois Steel Corporation's South Chicago Works and Gary Steel Works were recently opened for inspection in what was probably the largest open house ever held by the company. Visitors, totalling 56,500 from both plants, included workers' families, city, state and county officials, members of the general public and representatives of the press—all of whom were given the opportunity to view the conversion of flaming white ingots into hot-rolled and cold-rolled sheets.

This was the first open house ever held at South Works, production capacity of which is 4,525,000 tons of steel annually.

* *

Swedish Representative Visits Welding Industry

SVEN FAGRELL, welding representative in Stockholm, Sweden, for Hobart Brothers, Air Reduction Sales Co., Tweco Products and Progressive Welder Co., recently visited the United States to find out what the welding industry here is doing. In Sweden, Mr. Fagrell said, shipbuilding is doing well, and weldors are getting a good wage and are not clamoring for increases.

* *

Skilsaw Offers Line of Pneumatic Tools

SKILSAW, INC., Chicago, has entered the pneumatic tool field with a new line of 28 products, which include pneumatic hammers, drills, screwdrivers, nut runners and die grinders. These will all be produced at Aurora, Ill., leaving the Chicago plant free to continue production of the present line of electric tools.

* *

New Distributors

AMPCO METAL, INC., Milwaukee, Wis.: John C. Fitzpatrick Co., Toronto 1, Canada (distributor of all Ampco products except safety tools and arc welding electrodes) and Anstice Co., Rochester, N.Y. (distributor of all products except resistance and arc welding electrodes).

* *

Nelson Stud Welding Corp., Lorain, O.: Alex Hibbard Co., Denver, Colo., (distributor for Nelson stud welding products).

* *

Died. . .

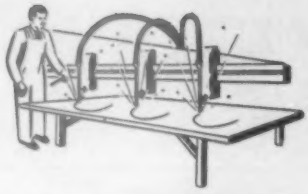
JOHN M. SINGER, superintendent of Cleveland Welding Co., died at his home in Cleveland, May 13. He was connected with the company for over 20 years and rated as an expert in production welding.

* *

J. LINN JOHNSON, founder and former president of Wilkes-Barre Welding and Machine Co., died May 4 at Miami Beach, Fla.

FOR THESE JOBS . . .

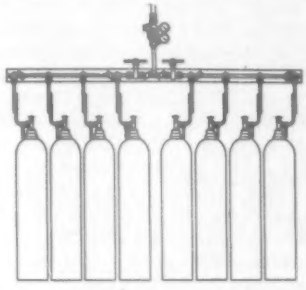
Production Welding



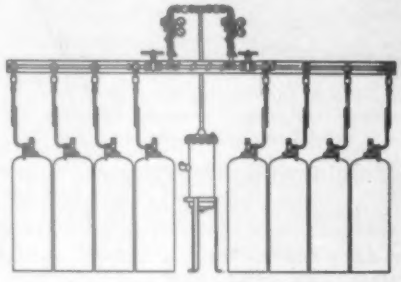
Production Cutting

. . . and operations such as welding and cutting heavy sections with hand torches, flame hardening and softening, flame cleaning . . . also any installation where a battery of cylinders is required.

YOU NEED THESE MANIFOLDS . . .



REGO
Oxygen Manifold



REGO
Acetylene Manifold

BECAUSE OF THESE ADVANTAGES . . .

- *Added Convenience* . . . Individual shut-off valves at each cylinder station permit the removal of any cylinder without shutting down one side of the manifold. Master shut-off valves control flow of each bank of cylinders.
- *Unit Construction* . . . Header assembly, mounted to steel I-beam, is virtually one piece. Extra-heavy pipe is run through header fittings, cylinder station shut-off valves and master shut-off valves, with all permanent connections silver-brazed.
- *Precision Regulation* . . . Uniform delivery pressure is assured by large capacity two-stage Regolators.
- *Exacting Tests* . . . Every RegO Manifold is subjected to a sustained air pressure test before shipment.

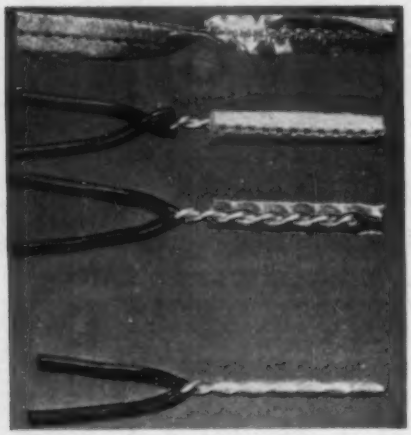
REGO **Manifolds for Oxygen . . . Acetylene . . . Hydrogen . . . Nitrogen and other high pressure gases.**

The BASTIAN-BLESSING Company

4201 W. Peterson Avenue Chicago 30, Illinois

Pioneer and Leader in the Design and Manufacture of Precision Equipment For Using and Controlling High Pressure Gases

New Products to Use



Top: plastic-coated soldering tape. Center: how the tape is wrapped around a spliced joint. Bottom: joint

Self-Soldering Tape

TESTED and found safe by the laboratory of the Bureau of Explosives, a new self-soldering tape for spliced wire joints consists of a strip of solder on one side and a strip of plastic on the other. No iron or torch is necessary to use it. The tape cannot be ignited by percussion, is chemically stable and contains no magnesium, powder or sulphur, states manufacturer.

Procedure for soldering an electrical connection is as follows: twist and clean the wires as in ordinary soldering; apply soldering flux; wrap the splice with a piece of soldering tape of the same length; press or pinching for intimate contact. Now light the outer end of the tape with a match or cigarette lighter. The plastic will burn at a temperature sufficient to melt the solder and cause it to flow over the wires. The black residue left can easily be wiped away with a rag while the joint is hot. The tape is available in widths of 3/16, 1¼ and 1½ in. W. B. FRANKLIN Co., Box 910, San Francisco.

★ ★

Abrasive Sticks

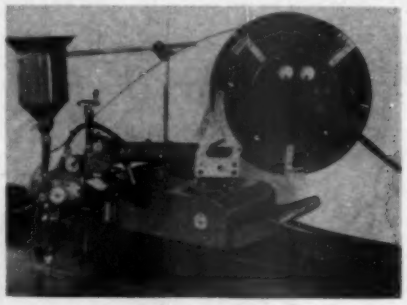
RECOMMENDED for all kinds of light grinding, cleaning, deburring, rust removal, sharpening, polishing, etc., is a line of rubber-bonded abrasive grains in stick form. These sticks can be cut to any desired contour with a jackknife, file or hacksaw. They may be fastened to the tool post of a lathe for rapid mechanical finishing operations.

Sticks are available in 3-in., 6-in., 8-in., lengths with fine, medium or coarse grains. Standard shapes include rectangular, square, triangular and rounds. Blocks are also available in 4 x 4 x ¾ in. sizes for large area finishing operations. SANDUSKY ABRASIVE WHEEL Co., 715 W. Ransom St., Kalamazoo, Mich.

Portable Automatic Welder

"DS-37" designates a 190-lb portable submerged-melt welder suitable for joining light-gauge sheet metal as well as heavier plate. It will butt weld material from 16-gauge to ¾ in. in thickness and will also make fillet welds with legs from ⅛ to ⅜ in. and plug welds in material ¼ to 1¼ in. thick. Electrodes of the coiled wire type are used in diameters of 3/32 to ¼ in., with current up to 1,200 amp. Welding speeds may be varied from 7 to 210 in. per minute.

Extensions are available for lengthening the nozzle assembly when making non-positioned fillet welds or welds below the level of the carriage. The welding head can be swung forward through 45 deg, tilted at any desired angle to either side or positioned anywhere in a circle around the carriage. Supporting arm of the head can be extended up to 5 in. The head also has a vertical adjustment of 5 in., or it can be set to permit vertical motion as the guide wheel follows the contour of the workpiece. THE LINDE AIR PRODUCTS Co., 30 E. 42nd St., New York City 17.



"DS-37" portable automatic welder, adjusted for a non-positioned fillet weld

★ ★

Portable D-C Welder

A NEW self-powered, 200-amp arc welder, "WN-200," is available as a stationary or a trailer unit, for either shop or field service. In both types engine and welder are mounted on an all-welded frame of tubing and steel angles. Welding range is from 30 to 260 amp. "Visimatic" calibration plates enable the operator to select instantly the exact welding current needed for each of three classes of electrodes.

Rated 30 volts at 2,900 rpm, the generator is self-excited by a set of auxiliary brushes mounted in advance of the main brushes. A heavy-duty, 4-cylinder air-cooled engine of 26.5 hp supplies power and a 5-strand V-belt transmits it to the generator. HARNISCHFEGER CORP., WELDING DIV., 4400 W. National Ave., Milwaukee 14.

Liquid Carbonic's HC-39 "Pacemaker" cutting torch

Cutting Torch

HC-39 "Pacemaker" is the name of a "big, tough cutting torch for big tough jobs." Designed with a free-flow mixing chamber, this 3½-lb, 20 in. torch has a recessed tip seat which prevents damage if it is dropped on its head. The hammer-end head provides additional strength to withstand rough usage. The torch is made for use with Gasweld tellurium-copper cutting tips. LIQUID CARBONIC CORP., WALL CHEMICAL DIV., 3100 S. Kedzie Ave., Chicago 23.

★ ★

Vice and Positioner

"PRESVISE" is a combination welding positioner, production vise and two-ton press, incorporating a "toe-touch" foot control and a regulator valve that may be set to provide any desired jaw pressure up to 4,000 lb. For press operations, an automatic release valve increases speed up to 60 strokes per minute. Various types of cutters can be mounted in place of standard jaws for trimming sheet metal, aluminum castings, etc. BRYANT PRODUCTS Co., 297 W. Michigan Ave., Jackson, Mich.

"Presvise," a combination welding positioner, production vise and press

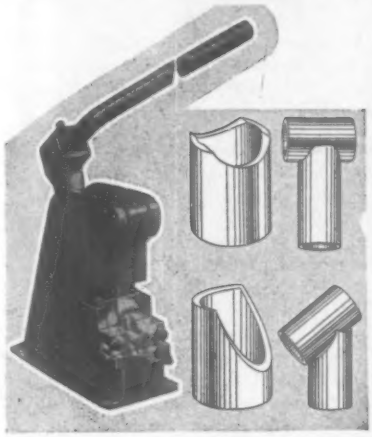
★ ★

Curved-Tooth File

"WIZCUT," an improved curved-tooth file, provides self-clearing of chips by superimposing serpentine chip-breaking grooves on the contour of the milled teeth. HELLER BROTHERS Co., Newark, N. J.

Tube Shearing Tool

DEVELOPED for preparing the ends of tubing for welded angle or T-joints, a new shearing tool, "Arc-Fit," weighs 90 lb and is of hardened steel construction. It is capable of shearing tubing from ¼ to 2 in. OD by means of two simple trusts. To operate, the tube or pipe is placed over the punch with the end of the material flush against the punch holder. The operator then trips the press, and the punch shears downward from the inside of the tube or pipe, cutting out the desired arc or segment. The material is then rotated 180 deg, and the operation repeated. Welds or brazes may then be made at the joint without further preparation. VOGEL TOOL AND DIE CORP., 2527 Moffat St., Chicago 47.



"Arc-Fit" shearing tool prepares pipe for welded or brazed T or angle joints

★ ★

Improved Electrode

AIRCO No. 190 is an improved high-tensile electrode of a type originally developed for welding aircraft assemblies. The advantages of the improved electrode are that preheating is minimized when welding high-strength chrome-moly aircraft steels, and there is less tendency toward cracking adjacent to the weld area and between the layers of weld metal when preheating is not employed. This electrode will give tensile strengths up to approximately 150,000 psi and produce welds more ductile than those previously obtained, states manufacturer. It is recommended for operation on d-c, straight polarity or on a-c. Airco 190 is available in 3/32, 1/8, 5/32 and 3/16 in. diameters. AIR REDUCTION SALES CO., 60 E. 42nd St., New York City 17.

★ ★

Metal Cutter

A NEW cutter for bolts, rod or wire is designed to cut all metals up to the hardness of case-hardened steel. It is featured by drop-forge handles and a two-way cutting jaw providing both side and end action. Cutting jaws are also available in a three-way combination which incorporates a nut splitter.

Through compound leverage, the application of 100 lb pressure gives 4 tons of cutting power at the jaws. MANCO MFG. CO., Bradley, Ill.

from FLAT SURFACES TO INTRICATE SHAPES with the New DI-ACRO BRAKE

• ROK-LOK—new sensitive material clamp increases accuracy
• DOUBLE-EDGED FORMING BLADE allows close reverse bends
• NEW PRECISION STOPS accurately control angularity of bends

This versatile metal forming machine was developed for use in model shops, experimental laboratories and production departments where it often replaces dies for all types of precision forming operations. Di-Acro Brakes will form a great variety of materials including bronze, stainless steel, aluminum and bi-metals.

WRITE FOR CATALOG. New edition of 40-page Di-Acro Catalog contains detailed information on all Di-Acro Brakes, Shears, and Benders and illustrates how these precision machines can be used individually or cooperatively for "DIE-LESS DUPLICATING".

◀ DI-ACRO Is Pronounced "Die-Ack-Ro"

DI-ACRO PRECISION MACHINES DIE-LESS DUPLICATING

O'NEIL-IRWIN MFG. CO.

385 8TH AVE., LAKE CITY, MINNESOTA

Fuse-Weld Cast Welding Rods

THE STANDARD OF QUALITY
Throughout the World

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CAST ALUMINUM
WELDING RODS
OF STANDARD ANALYSIS

•

PLAIN AND ALLOYED GRAY IRON
WELDING RODS
AND ELECTRODES

THE CHICAGO HARDWARE FOUNDRY CO.
Dependable Since 1897
747 ENGINEERING BUILDING
NORTH CHICAGO, ILLINOIS

LENAPE SPECIAL MANWAYS

SIMPLIFY DESIGN AND KEEP COSTS LOW

12"x18" Oval Manway and Swing Cover with Sight Opening.

When access openings of special type or special material are indicated, you may minimize both design time and construction cost by referring your requirements to Lenape.

We are regularly producing special constructions for chemical, refinery, food, cosmetic, beverage, pharmaceutical, and similar applications, in addition to our standard line.

Our recommendations as to type and material will simplify your design, procurement, and cost problems in the planning and initial estimate stages.

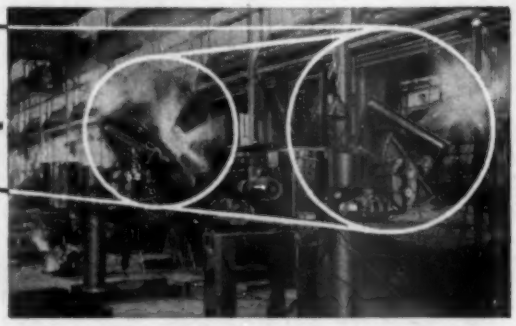
Quotations will be given our immediate attention—Bulletin 4-61 and current price schedule M-47 will be sent upon request.

LENAPE HYDRAULIC PRESSING AND FORGING CO.

LENAPE HYDRAULIC PRESSING & FORGING CO.
DEPT. 104 WEST CHESTER, PA.

BIG MAN ○ PRODUCTS

More WELDING going on here.....



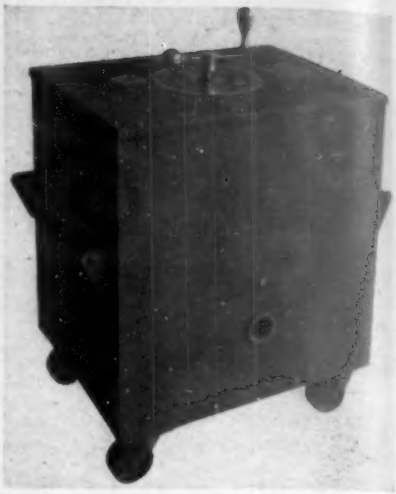
More welding and less time spent in flopping, propping up and crawling around weldments is the end result of the C-F Positioners in this welding department.

Mounted on C-F Welding Positioners, weldments can be quickly brought into position for a downhand pass—better, more uniform welds with resulting economies and production increases follow. Welders spend more time welding when they work with C-F Positioners because one "set-up" on the table allows them to maneuver the job without assistance, whether hand or power operated Positioners are used.

Power operated, variable speed C-F Positioners, with table rotation speeds in any range from 0 RPM and up, coupled with table tilt to 135° from the horizontal make them the logical choice for any production welding operation. Like all C-F Positioners, they have drilled tables for easy set-ups or tables can be quickly removed for installation of special fixtures or jigs. Write for Bulletin WP 22. CULLEN-FRIESTEDT CO., 1309 S. Kilbourn Ave., Chicago 23, Ill.

CULLEN-FRIESTEDT CO., CHICAGO 23, ILL.

C-F positioned welds mean better, more economical welds



Model "200" a-c welder for farms, garages, factory maintenance, etc.

Farm Welder

A NEW farm welder (model 200) meets all NEMA and REA requirements and is said to be ideal for farm and job shop welding. Overall efficiency is said to be 95% as measured by KW input. There are four transformer coils instead of two eliminating sticking and sputtering. The "200" operates on single-phase (or on one leg of two-phase or three-phase) power lines and draws only 30 amps. Stepless control provides more than 200 heat selections from 5 to 180 amp. The striking or arc holding voltage is said to increase as welding current is reduced, making it easy to hold the arc. A set of cables, electrode holder, face shield and an assortment of electrodes are furnished with each welder. US ELECTRIC WELDER CORP., 1258 Dorr St., Toledo 7, 0.

* *

A-P Electrodes

Two new all-position electrodes, "Agile Brown and Agile Red-White" meet all AWS E-6013 and E-6012 requirements, respectively. Agile Brown is recommended for welding of thin-gauge steels using a-c/d-c straight polarity. Outstanding features are ease of operation, soft arc action, minimum penetration, good appearance, minimum spatter loss and a high melting rate.

Agile Red-White is an improved general-purpose electrode suggested for production and maintenance work on mild steels. It also operates on a-c/d-c straight polarity and can be applied at highest current settings, even on poor fit-ups. This results in a fast rate of weld deposit without undercutting, states manufacturer. AMERICAN AGILE CORP., 5808 Hough Ave., Cleveland 3.

* *

Metal Protective

GROUND surfaces remain clean and threads are protected from oxidation when coated with "Seal-Peel." This protective coating is easily removed at the time the part is to be used, states manufacturer. JERGENS TOOL SPECIALTY Co., 712 E. 163rd St., Cleveland 10.

Federal's new mash seam welder for refrigeration manufacture

Multiple Seam Welder

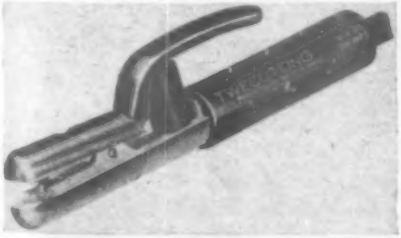
A HIGH-PRODUCTION mash seam welder, the Federal triple duplex traveling head series seam welder, contains three 300-kva water-cooled welding transformers wound for 440-volt, 60-cycle, single-phase a-c power supply, each with individual 16-step heat regulators. One transformer is mounted in each of the three dual welding heads. The machine has its own hydraulic system, complete with pumping unit and oil-cooling reservoir, for supplying fluid under pressure to the welding head, and each of the six welding heads is provided with an individual air cylinder for applying welding pressure. Heads are manually adjustable, vertically and laterally, while changes in weld travel length are accomplished by changing the limit switch settings.

This welder is recommended for making refrigerator food compartment liners. Mash seam welds are said to be superior to the standard overlapping seam welds in that they require no finishing or dressing and the enamel may be applied directly to the welded seams. FEDERAL MACHINE AND WELDER CO., Warren O.

* *

Electrode Holder

AN insulated tong-type electrode holder, No. A-316 "Twecotong," fills the requirements of the average job shop or maintenance weldor using 200-amp equipment. Weighing but 18 oz, this compact holder is said to have a 95-lb bite on a $\frac{3}{16}$-in. electrode. Tip and body insulation are of molded laminated glass-cloth Bakelite. Cable connection is a simple clamp, with a socket for soldering provided when desired. Holder is 9 in. long and has a $2\frac{3}{4}$-in. palm span; it will handle electrodes of $\frac{1}{16}$ through $\frac{3}{16}$ in. TWECO PRODUCTS CO., P.O. Box 666, Wichita 1, Kan.



No. A-316 tong-type electrode holder for use with 200-amp equipment

"KREMBS & COMPANY
669 W. Ohio Street
Chicago 10, Illinois

Gentlemen:

On January 30 you sent us a two-pound can of Fluxine No. 89 for experimental purposes. We have completed our tests on this flux. It was used on tinning of steel cable for fastening on lugs, on tinning of machined gray cast iron parts preparatory to filling with solder, and the tinning of steel parts before babbitting. In all cases the flux performed its work in a very satisfactory manner, and was superior to the muriatic acid mixture previously used. The flux is easily washed away after tinning has been accomplished. May we take this opportunity to thank you for your assistance. We are now ordering Fluxine No. 89 from local distributor."

(Facsimile of letter with signature on request)

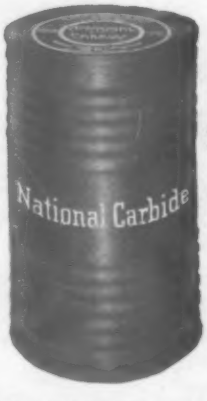
We have received many similar letters proving that Fluxine Fluxes are superior. They are the result of over sixty years of scientific research in this field. There are 89 different Fluxine Fluxes designed for each metal-joining operation.

Write on your company letter-head for generous sample and directions for using FLUXINE Fluxes.

KREMBS & COMPANY
Est. 1875
Dept. G, 669 W. Ohio St., Chicago 10, Ill.

FLUXINE
TRADE MARK REGISTERED U. S. PAT. OFF.
FLUXES TO JOIN ALL METALS

National
Carbide
EFFICIENT
ECONOMICAL
DEPENDABLE
for
Welding and Cutting
SPECIFY



NATIONAL CARBIDE IN THE RED DRUM

Write us for information as to nearest available stock.

NATIONAL CARBIDE CORPORATION
60 E. 42nd St., New York 17, N. Y.

MANGANAL
T. M. REG. U. S. PAT. OFF.
11 to 13½% Manganese-Nickel Steel
HOT ROLLED PLATES
and
APPLICATOR BARS
REBUILT THIS BUCKET LIKE NEW!

Worn Out Shovel Bucket on Scrap Pile.

Same Bucket Rebuilt with Manganal Hot Rolled Plates and Applicator Bars.

This bucket owned by the Five Indian Tribes, Muskogee, Okla. was rebuilt with one small piece of 1" thick Manganal Hot Rolled Plate, one 4 x ¾" Manganal Applicator Bar and 50 lbs. 5/16" Manganal special Tite-Kote Welding Electrodes. Put your scrap pile back to work economically and quickly with Manganal.

Write for FREE Booklet on "The Welding of 11 to 14% Manganese Steel."

NAME OF NEAREST DISTRIBUTOR UPON REQUEST

STULZ-SICKLES CO.
Sole Producers
91 N. J. Railroad Avenue, NEWARK 5, N. J.

POSITIONED WELDING PAYS!

Speed, Quality Improve— Costs Drop—with a

P&H WELDING POSITIONER

Test after test in plant after plant prove it! P&H Positioners cut welding costs up to 50%—greatly increase welding speed. It's because P&H Positioners enable operators to weld downhand—faster, easier—permit the use of larger electrodes for faster metal deposition. Want proof? Write for Bulletin P2-11

Features of P&H WP-2 Positioner

- 2500 lbs. capacity
- Faster to operate, more versatile
- Hydraulic power tilting
- 360° table rotation—135° table tilting
- Telescopic elevation
- Manual turning to suit welding speeds (Also power rotation)
- Portable or column-in-floor mounting.

Other P&H models up to 36,000 lbs. capacity

P&H WELDING POSITIONER
4513 W. National Ave.,
Milwaukee 14, Wisconsin
HARNISCHFEGER CORPORATION

Johnson "Jiffy Kit" for farm and job shop repairs—a complete weldery in one

Portable Welding Unit

A PORTABLE oxy-acetylene welding and cutting outfit, the Johnson "Jiffy Kit," is useful for farm repairs, refrigeration, plumbing, electrical, etc. The kit contains a small-size cylinder holding 45 cu ft of oxygen, an acetylene cylinder holding 40 cu ft, pressure regulators for each gas, a torch with several welding and cutting tips, lighter, wrenches, etc. A-A WELDING SUPPLY CO., 9228 S. Ada St., Chicago 20.

* *

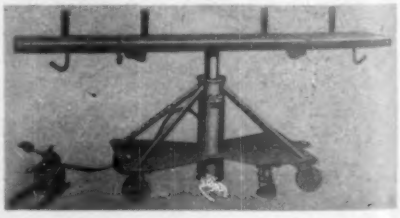
Dust Goggles

PROTECTION against dust, wide-angle vision, good ventilation, maximum comfort and safety are some of the claims of new dust goggles offered by American Optical Co. The flexible leather mask is bound at the edges with soft corduroy, providing comfort and tight fit. Eyecups are deep set to prevent obstruction of side vision. "Armor-plate" clear lenses or "Calobar" lenses in medium, dark or extra dark shades may be obtained. AMERICAN OPTICAL CO., Southbridge, Mass.

* *

Sheet Metal Feeder

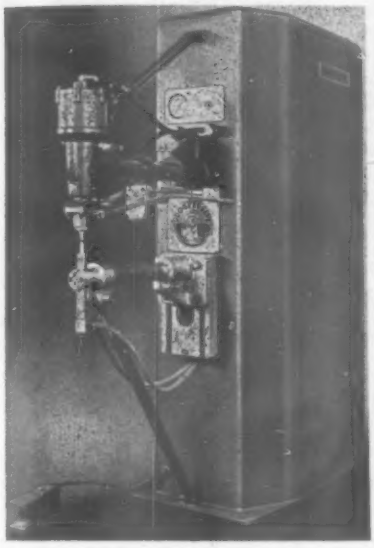
RECOMMENDED for feeding strip or sheet metal to shears, rolling mills, etc., a new portable hydraulic elevating table accommodates bundles of stock loaded by overhead hoists or fork trucks. Its elevating feature enables the operator to keep the stock at a desired height for feeding. Top of the table consists of one rigid section the length of the base plus two removable extensions for longer loads. LYON-RAYMOND CORP., 3456 Madison St., Greene, N. Y.



Elevating table feeds sheet metal into shears, rolling mills, etc.

Spot Welders

A NEW line of 30, 50 and 75-kva pedestal-type spot welders contains many innovations. Removable sheet-metal panels and a full-length door on the left side provide accessibility to all mechanical parts. The opposite side is clear for the side mounting of electronic or other welding controls. Maximum stroke is 2½ in., and different types of interchangeable electrode holders are available. The throat opening is unusually large (up to 12½ in.) PROGRESSIVE WELDER CO., 3050 E. Outer Drive, Detroit 12.



Pedestal-type spot welder with low-inertia head for high-speed production

* *

Inert Gas Meter

AVAILABLE to all users of inert-gas-shielded welding is a new flowmeter, the "Victrometer," which was originally designed to meet the precise standards of the medical profession. It can be furnished with graduations for argon or commercially pure helium. The large black indicating ball can be easily read from a considerable distance, and the calibrations are visible from both front and back of the meter. A single control wheel accurately provides any fractional flow of gas desired and maintains it uniformly. VICTOR EQUIPMENT CO., 844-54 Folsom St., San Francisco 7.

* *

Cast-Iron Flux Paste

RECOMMENDED for use in the repair of broken castings, salvage of defective castings and repair of pitted cast-iron molds is a new paste flux, "All-State No. 1A," for oxy-acetylene welding. The flux is painted on the cleaned surface of the iron while the casting is still cold. A single application is usually sufficient, although the welding rod may be painted with the same flux. Use of this flux, as directed, is said to protect against surface oxidation and porosity. ALL-STATE WELDING ALLOYS CO., 96 W. Post Road, White Plains, N. Y.

Photologue-------FOR WELDING CATALOG SERVICE

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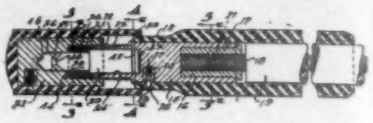
From the Patent Office

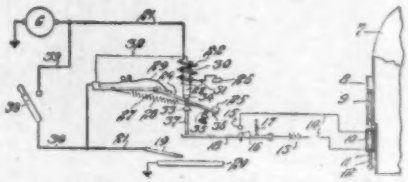


Electrode Holder

2,415,778 RUSSEL A. WELCH, Detroit. Filed April 30, 1945. Issued Feb. 11, 1947.

An electrode holder having a handle made of insulating. The handle contains projecting internal and external ribs, the base of the ribs on the interior and exterior of the handle being aligned with each other. A conducting terminal has ribs nesting with the ribs on the interior of the handle. An insulating cap contains a conducting head adjustably secured on the terminal.

* *



Circuit for Welding Helmet

2,418,415. WAYNE LESER, South Ozone Park, N.Y. Filed March 7, 1944. Issued April 1, 1947.

Circuit for connection to a weldor's helmet that is energized automatically upon striking of the arc to close a protective screen. The circuit includes magnetic turns forming a holding coil, a switch in series, a switch-throwing magnet in series in the welding circuit but bridged about the welding circuit switch and an armature operable by the magnet and arranged when so operated to be retained by the holding coil. The armature has a lost-motion operating connection with the switch so that the screen-controlling means operates in advance of the switch closing action.

* *

Electrode Conveyor

2,416,690 WILBERT E. HARDY, McKees Rocks, Pa., assigned to THE McKAY Co., Pittsburgh Pa. Filed March 9, 1943. Issued March 4, 1947.

Apparatus for handling magnetic rods discharged longitudinally, in free flight and in rapid succession from a feeding mechanism. It includes a conveyor below the discharge path of the rods, a target adjacent the conveyor adapted to arrest the rods in flight, and a magnet below the conveyor to attract the rods onto the conveyor after they rebound from the target.

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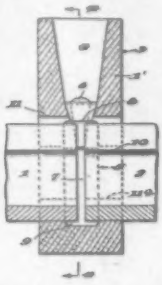
ST. LOUIS 7, MISSOURI

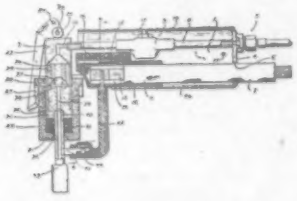
Thermit Welding Mold

2,416,863 EDWARD F. BEGTRUP, Elizabeth, N. J., assigned to METAL & THERMIT CORP., N. Y. Filed June 29, 1944. Issued March 4, 1947.



A mold for the thermit welding of railroad rails. The two mold parts forming a cavity enclosing the abutting ends of two rails and defining a fusion collar-forming space about the joint. A preheating gate connected with the mold cavity and at least one pair of preheating vents extends from the mold cavity on either side in contact with the larger cross-section of the rails. The preheating of the rail thus tends to be equalized.

★ ★

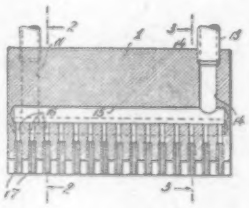


Arc-Oxygen Cutting Torch

2,416,278 HAROLD ORVILLE AUSTIN and EDWARD D. BUNNELL, United States Navy. Filed November 27, 1944. Issued February 25, 1947.

A fully insulated arc-oxygen torch having a grip portion, an oxygen supply valve opened by increasing the grip pressure, an electric cable and a self-locking chuck. The chuck grips a tubular electrode and presses it firmly against the contact element of the cable terminal.

★ ★



Flame-Priming Torch

2,418,533. GEORGE L. WALKER, Jersey City, N.J., assigned to AIR REDUCTION SALES CO., New York City. Filed Jan. 26, 1944. Issued April 8, 1947.

A gas torch comprising an elongated block having a recess extending lengthwise in its lower face. A series of nozzles project into and through the recess and terminate flush with the lowermost portion of the tip face. Oxygen is delivered to all of the gas passages of one series and fuel gas to all of the gas passages of another series.

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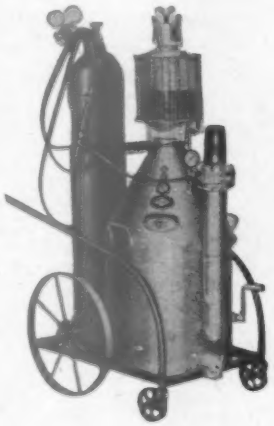

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Contract Awarded

★ **Ark., Magnolia**—PLANT—D. E. Buchanan, Magnolia, natural gasoline recovery plant, to Petroleum Engineering Inc., National Bank Tulsa Bldg., Tulsa, Okla. $2,225,000.

Contract Awarded

★ **Kan., McPherson**—REFORMER UNIT—Bay Petroleum Corp., Midland Savings Bldg., Denver, Colo., 1,000 bbl. reformer unit at refinery, to Refinery Engineering Co., 600 S. Michigan St., Chicago, Ill. Approx. $750,000. Universal Oil Products Co., 310 S. Michigan St., Chicago, Ill., engr.

Low Bidder

La., Benton—GAS SYSTEM—City, May 21, natural gas sys., from Roy M. Mitchell, 715 Eatman B. C., Shreveport. $46,534.

Rejected Bid

La., New Orleans—GAS SERVICE SYSTEM—Housing Authority of New Orleans, 226 Carondelet St., rejected bids Apr. 17, complete gas service sys., St. Bernard Ave. Proj. L.B. $254,283. Low Bidder reported W.E. June, p. 94.

Contract Awarded

Mich., River Rouge—PLANT—Sun Oil Co., 1487 Woodward Ave., Detroit, oil storage plant, to Darin & Armstrong, 2041 Fenkell Ave., Detroit. Est. $396,700.

Low Bidder

Miss., Oxford—GAS SYSTEM—City, c/o mayor, May 12, natural gas sys., from Clement Botpouey Jr. & Co., Canal Bldg., New Orleans, La. $223,050.

Contract Awarded

O., Toledo—GAS LINES—Ohio Fuel Gas Co., Huron St., over 36,000 ft. gas lines and 3 regulator stations, own forces. $125,000.

Low Bidder

†**Okla., Oklahoma City**—AIRPORT IMPRVTS.—U. S. Eng., P.O. Box 61, Tulsa 2, Tinker Field Sprinkling Sys., c.i. pipe mains and lines etc., Inv. 34-066-47-59, from Grinnell Co., Inc., 1315 Marilla St., Dallas, Tex. $153,602.

Contract Awarded

★ **Texas**—GAS GATHERING LINES—Magnolia Petroleum Co., Magnolia Bldg., Dallas, 58 mi. 4- to 24-in. flare gas gathering pipeline from wells in Seelingson field to processing plant near Corpus Christi, to Henry L. Lemons & Co., Corpus Christi. Approx. $975,000.

Contract Awarded

★ **Texas, Arkansas and Illinois**—OIL PIPELINE—Magnolia Pipe Line Co., Magnolia Bldg., Dallas, Tex., 109 mi. 20 in. welded joint pipe from Corsicana, Tex., to Hot Springs, Ark., and 332 mi. 20 in. crude oil welded joint pipeline between Conway, Ark., and Patoka, Ill., to Oklahoma Contg. Co., Mercantile Bank Bldg., Dallas, Tex., approx. $5,232,000 and $15,936,000 respectively***108 mi. 20 in. line between near Hot Springs to beyond Little Rock, Ark., to Eastern Constr. Co., Inc., Mercantile Bank Bldg., Dallas, Tex., approx. $5,184,000***111 mi. 20 in. line from beyond Little Rock to Conway, Ark., to H. C. Price Co., Bartlesville, Okla., approx. $5,328,000. Grand total approx. $31,680,000.

Contract Awarded

Texas—OIL PIPELINE—Magnolia Petroleum Co., Magnolia Bldg., Dallas, about 120 mi. addnl. gathering oil pipeline sys. (from various producing wells in Seeligsonfield to casing head gasoline plant) near Premont, Jim Wells Co., to Henry L. Lemons, Corpus Christi. Approx. $235,000.

Low Bidder

★ **Tex., Lubbock**—WATER SUPPLY—City Apr. 24, low preasure 30 and 36 in. c.i. water supply main, from R. H. Fulton, 2711 Avenue H, $661,114; 10 m.g. rein.-con. water storage reservoir, brick, concrete pump bldg., from Panhandle Constr. Co., Lubbock, $220,000.

Contract Awarded

★ **Va., Danville**—WATERWORKS IMPROVEMENTS—City, WW imprvs. in 7 sections, to V. B. Higgins Co., Greensboro, N. C., $684,700.

Low Bidders

Wash., Seattle—AIRPORT IMPRVS.—Port of Seattle, Bell St. Terminal, Zone 1, May 2, 18,760 ft. 8 and 16 in. steel water supply sys. for fire protection at Seattle-Tacoma Airport, from Stateside Constr. Co., 905 10 Ave. S. $177,000. Est. over $22,500. G. T. Treadwell, ch. engr.

Contract Awarded

★ **Wash., Tacoma**—WATER SUPPLY—City, City Hall, 23,143 ft. 58 in. steel pipe for water supply line, to American Pipe & Constr. Co., 518 N. E. Columbia Blvd., Portland, Ore. $591,676.

CANADA

Contract Awarded

British Columbia—HYDRO DEVELOPMENT PENSTOCK—British Columbia Electric Co. Ltd., 425 Carroll St., Vancouver, 2,400 ft. welded steel pipe penstock 6 ft. diam. for hydro development carrying Bridge River water from tunnel through Mission Mountain down steep slope to generating plant on Seton Lake, to Vancouver Iron Works Ltd., 1155 W. 6 Ave., Vancouver. $330,000. T. Ingledow, 425 Carroll St., Vancouver, engr.

LATIN AMERICA

Contract Awarded

Argentina—GAS PIPELINE—Argentina States (Gas Service Dpt. Gas Dpt. of Argentine Govt.). Buenos Aires, 190 mi. 10¾ in. natural gas pipeline from Buenos Aires end of project, force account. $5,000,000.

Contract Awarded

★ **Brazil**—OIL PIPELINE—Republic of Bolivia, La Paz, Bolivia, Dpt. P. Wks., 250 mi. 18 in. crude oil pipeline carrier between Camiri fields to Tin-Tin, to Williams Bros. Co., Natl. Bank Tulsa Bldg., Tulsa, Okla., U.S.A. Approx. $12,500,000.

Contract Awarded

★ **Brazil**—OIL REFINERY—Rio de Janeiro, Refinaria de Petroleos de Distrito Federal, S. A., c/o J. F. Salgado Filho, pres., oil refinery plant, to Foster Wheeler Corp., Shell Bldg., Houston, Tex., U.S.A. Approx. $10,000,000.

Structural Bridges and Other

Low Bidder

Alabama—BRIDGES—State Hy. Dpt., Montgomery, May 23, 4,630 mi. bridges, Dekalb and Cherokee Counties, and 0.193 mi. Clark Co., from Baird & Latimer Co., Selma, $69,999 and $122,437 respectively***1.23 mi. Marengo Co., from Mitchell & Tinsley Constr. Co., Birmingham, $66,618***0.263 mi. Geneva Co., from Scott Constr. Co., Thomasville, Ga., $247,460*** 0.104 mi. Madison Co., from W. J. Tidewell, Jr., Douglasville, Ga., $88,460*** 0.897 mi. Autauga Co., from M. A. Thomson Co., 121 S. Lewis St., Montgomery, $50,554.

Low Bidder

California—BRIDGES—State Div. Hys., Sacramento, Apr. 30, two bridges Fresno and Madera Counties, from Charles C. MacClosky, 112 Market St., San Francisco, $253,917; bridge and underpass in Siskiyou Co., from Ted F. Baun, 324 Princeton Ave., Fresno, $319,308.

Rejected Bid

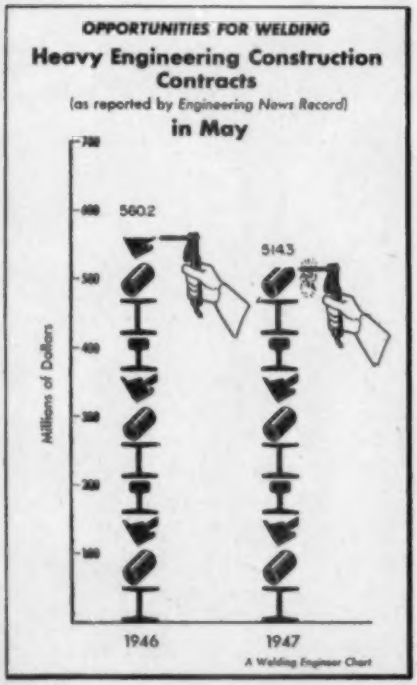
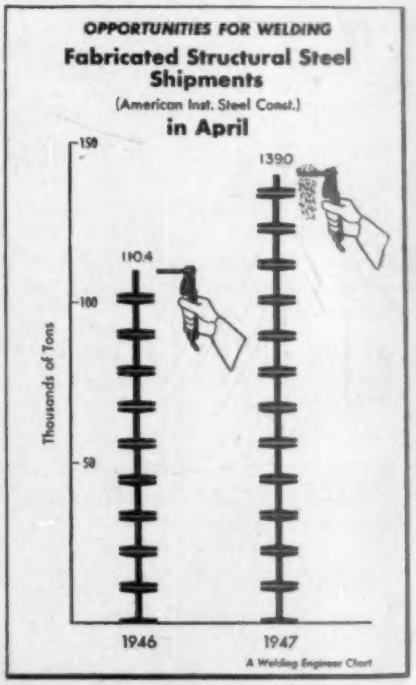
★ †**D. C., Wash.**—PIER—U.S. Eng., 1 and Douglas Sts. N. W., Zone 25, rejected bids Apr. 24, constructing Pier 4, incl. bulkhead wall, etc., along Maine Ave., Potomac River Washington Channel, Serial No. W-49-80-47-67-(17)C. L.B. $746,729. Low Bidder reported W.E. June, p. 94.

Rejected Bid

Georgia—BRIDGES—State Hy. Dpt., Atlanta, rejected bids Apr. 25, improv. bridges, F-431 (5) Lowndes Co. L. B. $69,552. Low Bidder reported W.E., June, p. 95.

Low Bidder

Ill., Chicago—VIADUCT—City, Dpt. P. Wks., City Hall, May 5, steel framing North State St. viaduct, from Overland Constr. Co., 205 W. Wacker Dr. $129,815.

Low Bidder

Ill., Chicago—BRIDGE SUPERSTRUCTURE—City, Dpt. P. Wks., City Hall, May 16, superstructure, E. 130 St. fixed hy. bridge over Calumet River, from William J. Howard, Inc., 35 E. Wacker Dr., Chicago. $318,535.